Fillmore · Ruthvelt · Raymondale · Elwood Jct. · P. Richmond · Marthaville · Summit · Colbert · Donaldson · Ginia · Louise Manor · St. Michael · Villa Rica · Chapelle

RV · EJ · FM · RD · MV · SM · DN · CO · GA · LM · VR · CH

Overlapping local cabs

Mainline cabs, Fillmore div. · Mainline cabs, Chapelle div.

LEGEND

 Switch, normal for straight track

 Switch, normal for curved track

 Switch, interlocked

 Spring switch

 Double slip switch

 Single slip switch

 Engineer control board. Dots indicate number of operators.

2" Elevation

 Station

 Propulsion circuit break

 Girder bridge with abutments

 Truss bridge

 Bascule bridge

 Trestle

Valley vista +290 +390 +210 8"

El. 5'-0"

Mountainous

Yard limit

Profiles

Orchard

El. 1"

Valley vista

GINIA

GA

+220

S.

Chapelle div.

Profile flats of town of Raymondale in perspective

Steam engines

El. 1-11"

+370

+60

Freight

Passenger

CO

DN

RAYMONDALE

5M RD

COLBERT

DONALDSON

+270

+230

Fillmore div.

N.

SUMMIT

Road

+360

PHOTO NO.7

Electric engines

+180

Lift No.5

Checkerboard farm lands

PHOTO NO.5

Lift No.6 +170

PHOTO NO.6

PASSAGE

ST. MICHAELS

Winnepasooki Cr.

+240

VR-EJ

Masonry arch

ELWOOD JUNC.

+260 10"

El. 6'-0"

Distant rolling hills

+90

← PASSAGE →

VILLA RICA - town in perspective on cut-out profiles

River valley painted in perspective

Mountainous ← PASSAGE →

CH, main cabs Future painting of
24 levers 19 levers metropolitan city Engine yard 7 levers

+30 +400

CHAPELLE
Southern terminal

+130

Stone arches

El. 7½"

Little

River

+310

Martha-
ville

+120

Hydro dam

Stone arch

+190

Derrick-work cars

N.

PHOTO NO.3

El. 0" +10

PHOTO NO. 2

2 mainline cabs
Chapelle div.

PHOTO NO.1

00

RUTHVELT

RV

Road

Edison batteries and chargers
under on roll-out dolly

473'-8"

Drop No. 8

+420

3" 3"

+320 El. 9"

+110

LOUISE MANOR

FILLMORE
Northern
terminal

+470

+460

Ret. wall

Up

Street

Port Richmond

Street

PR-MV

ELEANOR

PHOTO NO. 4

LM
Local and mainline cabs,
Chapelle div.

PHOTO NO. 9

3 mainline cabs
Fillmore div.

FM

Road

Semi-built

WORKSHOP, AREAS

+430

Future
industries

Lift No. 4

Lift No. 3

MOUNT

420' Lift No. 7
S

+440

10"

Sky
backing

Lift No. 2
El. 6'-0"

Lift No.1

Four hinged lifts for passage
DOOR

+450

Profiles

The *Art* of Model Railroading

**You Have the Layout and the Equipment — a Stage Setting, So to Speak. Here's How to Pack Real Interest Into Operating These Props by Producing Prototype Railroad Activity.**

By Frank Ellison.

WHAT has become of the Mid-Nightmare Flyer and all the other dream trains of the Parlor & Dining Room RR. that used to wheel over Mt. Reverie? What has become of the dream itself—that magical vision which stirred and took shape on the day we brought home the first toy train for the kid's Christmas?

It was a wonderful dream of tracks, trains and a procession of towns and rolling hills; of picturesque little way freights perambulating over the curving tracks to pick up and deliver freight at dozens of sleepy country towns; of switching that drag to the siding to clear the main for the ballast-scorching Armchair Limited whistling around Phantasy Curve to pass in a swirl of whimsical dust. It was a dream of action, too—of trains of every class to be found on a dispatcher's train sheet, wheeling over a busy arterial highway of steel, weaving in and out of way-station sidings to overtake or to meet and pass. It was, in truth, the dream of a transportation system at work.

Do you know what happened to that dream? We starved it to death. We smothered it beneath a mass of track, signal and train-control design, which is called model engineering; we buried it under a heap of construction (engines, cars, switches, signals and lineside structures), which is called model building.
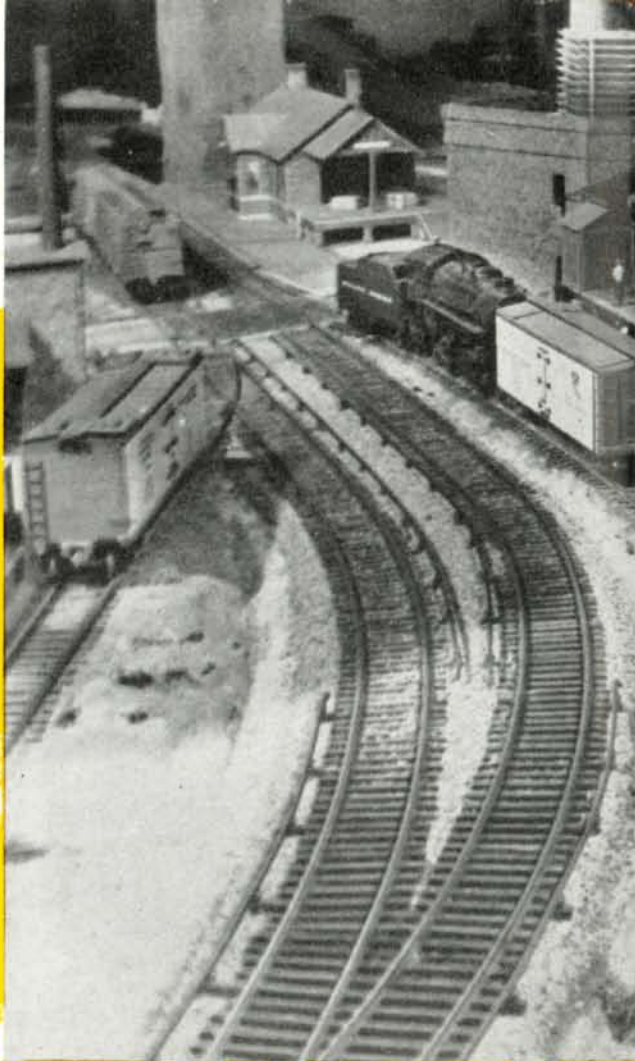
Switching at Donaldson. Cars have been shunted to sand-yard trestle, meat packer's loading platform, wholesale grocery, boiler house at cannery, and box factory. The train is distributed but in the clear for an overtaking meet with No. 106, time freight due in five minutes (25 seconds), and No. 19, Delta Limited.

In our dedication to model building and model engineering, we seem to have forgotten that both are only contributing elements to the consummate art of model railroading. And to stop short of this final goal is to build a stage with all its scenery and electrical effects—but never to produce a play.

For model railroading is definitely a play. It is the presentation of the drama of railroading in which the tracks are the stage, the buildings and scenery are the setting, the trains are the actors, and the operating schedule is the plot.

Model railroading is more than simply running trains around a track. It is an art founded on all the accumulated principles governing real railroad operation, but with a separate and very definite set of rules of its own. To be sure, it has to do with mainline and auxiliary tracks, with the variety and character of trains, the

around these concepts and I offer it for illustration. Here, then, are close-ups of action at strategic points picked from the continuous, connected flow of traffic and "stopped" for analysis.

Act 1: Darkness on the Delta.

Since the Stygian darkness that is 3 o'clock in the morning (basement war time), the switch crew has been riding the steps of the switcher up and down the lead track in the city freight yard at Chapelle (southern terminal), poking into the outbound tracks, private spurs, team and storage tracks, to pick up cars for marshaling into the consist of a way freight—No. 156, the Colbert Local on the timetable, but affectionately dubbed the Peddler by the crew.

Then, as the first faint flush of dawn lights up the parallel rows of boxcar roofs, the goat goes rolling over the frogs to the coach yard, there to make up the early morning plug. This is No. 8, the Pathfinder, a medium-speed passenger train, and the switch crew assembles a coach and Pullman from the cleaners' platform, an express reefer and baggage-express from the express building, a postal car from the mail track, and couples them together on Track 3 under the umbrella shed.

By now it is 6 a.m. and the hostler wheels a Consolidation and a Hudson to the turntable, services them at the coal chute, water crane, sand pipe, and spots them on the parade track.

At 6:30 he backs the Consolidation to the Peddler, the Hudson to the Pathfinder.

6:40, and the goat nudges a crummy to the tail end of the way freight.

6:50: The five-car Diesel-electric express (No. 30, the Dawn Buster) backs to Track 4.

speeds at which they run and the work they have to do, with the handling of shipments to consignees, service to passengers, with systems of car routing and train make-up, and with schedules of operation. But, beyond that, it is a swift and endless kaleidoscope of dramatic situations, incidents, maneuverings, and problems—each with its own exciting moments of suspense and climax. It—well, gosh, man—it has more thrills per minute than a game of strip poker. It is a goal worthy of your best efforts. May its enchantment and excitement spread like contagion to all of you who have dreamed the dream—but wakened too soon!

Schedule No. 4 on Delta Lines is built

The timing is split-second and Adam's apples ripple up and down like the jiggling needle on a spring scale.

Mt. Eleanor cut

No. 154 takes crossover to southbound main

Cars on interchange track for No. 154

End of double track

To Ginia

(A) No. 154 arrives 8:20 a.m.

(B) No. 8 arrives 8:23 a.m.

(C) No. 30 passes at 8:28 a.m.

No. 8 picks up diner

Louise Manor station

Carter's Little River Mills

And now it is 6:55. The mainline schedule is about to start. All three trains are made up and ready to leave: the Peddler at 7 a.m., the Pathfinder at 7:08, and the Dawn Buster at 7:20. These are the early birds, the first three of a parade of 23 trains. Hoggers have checked their train consists and running orders, are watching the minute hand travel the last five minutes. Talk dies to a murmur, then to tense quiet, and scale minutes take on added importance . . .

Act 2: A Three-Way Meet Garnished With Switching.

We'll leave the boys to develop the situation at Chapelle and skip ahead to Louise Manor, passing three small towns on the way. The three trains are steaming toward us along the northbound main line at speeds of 30, 60 and 80 miles an hour, and one of three things is going to happen:

1. The two swift passengers will have to slow down and lose time behind the plodding freight, or

2. The slower trains will duck into the hole to let the faster ones through, or

3. There's going to be one swell smash-up of equipment.

The thing to do, of course, is to let the fast ones by, and so at Louise Manor, the Peddler, arriving first, stops at the target and enters the side track. A few seconds later, the Pathfinder slows down, takes the crossover and rolls to a stop on the southbound main. Then the wind-splitting Dawn Buster comes swinging around the Mt. Eleanor cut, calls for signals with four blasts on her air horn, receives a clear board, and lunges full tilt down the cleared alley between the two waiting trains to pass in a flash and a thrill.

It is one of the spectacular stunts of model railroading, and the engineers handling it are the stars of the show, for all three trains arrive at the meeting point within intervals of a few seconds, there to be disposed in pre-arranged and unhurried fashion for a most dramatic maneuver. The timing is split-second and Adam's apples ripple up and down like the jiggling needle on a spring scale.

But this isn't all there is to the meet. The garnishment comes when the Pathfinder cuts in the

breakfast diner and the Peddler switches cars on the house and interchange tracks after the streamliner whizzes by. (Oh, well, it's no worse than carrying on three conversations on three telephones at once!)

Thus, the sleepy little junction town of Louise Manor has its few seconds of high excitement in

The two hoppers of coal were picked up at Raymond Colliery by way freight in Fillmore Division, transferred to dispatch freight at division yards, hauled to Chapelle terminal. They are now being delivered by No. 154: Virginian to coal yard at Ginia, C&O to boiler house at Donaldson Canning Co. at Donaldson.

which the first becomes last and the last becomes first, and returns again to its bucolic slumbers.

Act 3: Didoes at Donaldson.

It's just another way-station on the pike, but Donaldson is a busy shipping point and the scale hour from 8 to 9 a.m. (five minutes in actual time, you know) witnesses some ticklish and showy bits of throttle juggling.

The two passenger trains have long since passed through and the Peddler, having stopped down the line at Ginia to set out a hopper of coal on the Gulf Coal & Dock Co. trestle, pulls into Donaldson for an hour's switching. This trip, it sets out and picks up cars at the Spot Cash Wholesale Grocery, Ob Long Box Co., Hamm & Berger Meat Packers ("Try Our Line of Baloney"), the Quick Sand & Gravel Co. trestle, and transfers a chilled freezer from the icing platform to the Hap Hazard Packing Co. for loading a carload of early raspberries—not the Bronx-cheer brand.

This would be a routine switching job if Engineer Norman Wright didn't have to keep a weather eye cocked on that dizzy scale clock as he plays a duet on the reverse lever and throttle, for he has to juggle his switching time to be in the clear for two meets: the first with No. 106, a time freight now burning up the roadbed

The Peddler, steaming over the Winnepasooki Creek bridge at 30 m. p. h., is heading for a siding at Louise Manor to clear the main for two strings o' varnish overtaking her at 60 and 80 per. Just as with real railroads, timing must be perfect or the whole schedule is upset. That's what makes operation interesting.

from the south; and the second with the Delta Limited, bearing down on him from the north.

No. 106, which left the Chapelle yards an hour after the Peddler, overtakes it at Donaldson. Hogger Edmond Grosz has orders to pick up a cut of empty tankers from the Gargle Oil Co. spur here and so stops for the maneuver, and the situation immediately becomes involved. Both trains are now carrying on switching operations on adjoining tracks, each quite independently of the other. It is a situation calling for concentration on the part of the two hoggers and the brakemen, and visiting rails have been known to develop bug eyes and a drooling lip from merely watching it.

The hotshot completes its assignment on time, an incredible achievement to Grosz, who then and there acquires a smug expression. He gets the highball from the brakie and pulls out of town for the next station north—Colbert— where he has a scheduled meet with the southbound Delta Limited. And the Limited, after executing the meet, continues south to 'roll through Donaldson and pass the Peddler waiting on the siding.

Carl Lundstrom, brakeman, then gives Hogger Wright the highball—a signal achieved with a debonaire wave of the hand and whistling two staccato blasts through his teeth—and the Peddler rolls back to the main stem, hightails to follow the hotshot over Oldman River bridge, through the limestone cut in Callyer Bluffs to complete its final spurt at Colbert. If railroading on your pike gets dull, toy with these didoes at your Donaldson.

Act 4: Division Point.

Colbert is just a wide place in the road—five yard tracks and modest engine facilities— but trains are constantly arriving and departing, some to end their runs and tie up in the yards, others to be assembled and dispatched north or south over one or the other of the two divisions. Here all through trains change locomotives and are otherwise inspected and serviced during a scale 10- or 20-minute stop.

This kind of yard is frequently hidden from view behind scenery and used as a place to hold trains in concealment to make their runs seem longer. Rip away the scenery and let everyone enjoy the fine action that goes on here. For example:

No. 106, the time freight, has just arrived from Donaldson and is changing locomotives as a switcher cuts out the caboose, switches a block of cars to a layover track and couples others to the train.

While these maneuvers are being executed, the southbound Delta Limited, with Esmond Keating at the throttle, arrives from the northern (Fillmore) division to change locomotives and pull out for its run over the southern (Chapelle) division. Then the Peddler arrives in the yard a few seconds later to tie up on a storage track, its engine wheeled to the engine yard. And finally the Southern Oriole, a new train with Engineer Keating (who has amazingly returned to the other end of the division in nothing flat) rolls in from the north for a five-minute stop and continues southward-ho.

Consolidation engine, having pulled MDT reefer from icing platform across the tracks, is spotting it for loading at packing-house shed at Donaldson. This is the last of nine switching maneuvers before completing a three-hour run to division yards.

Now, after a 45-minute working stop, during which four trains have occupied the tracks, No. 106, with Rowland Peak at the throttle of its fresh engine and with fresh caboose and an altered consist, wheels through the fan to complete its scheduled run north to Fillmore.

And so it goes. The ebb and flow of traffic at Colbert rises and falls. At times all tracks are empty; at others, every one is occupied.

It is clear that a good model railroad is not a thing to be conceived and dashed off in an hour's time. It is, rather, the result of a long series of experiments and changes and of ruthless elimination of awkward situations, dull periods, and stage waits. But once perfected, it is a rare piece of work and a high potential for good railroading and plenty of exciting fun.

Cast of Characters.

If this has seemed like the operations of a big club with 20 or more members, consider that the crew operating the Delta schedule numbers four or five members and has never exceeded seven. Everybody doubles in brass. Bill Carney, yardmaster at Chapelle, for instance, is also switch foreman, pin puller, field man, roundhouse foreman, hostler, and towerman.

Another protean character is the Universal Brakeman. He gets more action than anybody on the pike, for the U. B. is everywhere at once, being conductor and brakeman for every train on the high iron. It's no job for a student, since he has to have the agility of a monkey, a brain that can keep the location and identity of four or five trains constantly card-indexed in his mind, the deft fingers of a Jose Iturbi, and a sense of direction that would do credit to the Sperry gyroscope. He darts, jumps, hops, skips, ducks, dives and all but skins the cat as he flits from station to station to line switches, couple cars, signal four different engineers—but why go on?

The two engineers in the Chappelle division have the ubiquitous yardmaster to do the terminal switching, but the two chaps handling the Fillmore run double as their own yard crew at the northern terminal and also handle the work in the division yards.

Perhaps you wouldn't classify him as a typical specimen, but we indulgently dub the seventh man the dispatcher. *Sans* interphone, the fellow stands in the middle of the layout where he can watch the progress of the trains and follow them on a large master-schedule chart. He substitutes lung power for a train wire to issue running orders, change meets, and the like. When trains get in such a snarl that he can't talk fast enough to get 'em untangled, he reverts to the primitive and yells *"Whoa, damit!"* He is also trainmaster, but perhaps his most useful role is that of wreck-train foreman.

So that, fellows, is the set up. We have a persistent shortage of manpower and just the bare essentials in rolling stock, but the schedule is a whale of a lot of fun, doesn't cost a zinc penny, and demands no priorities. We're set for the duration. *(To be continued.)*
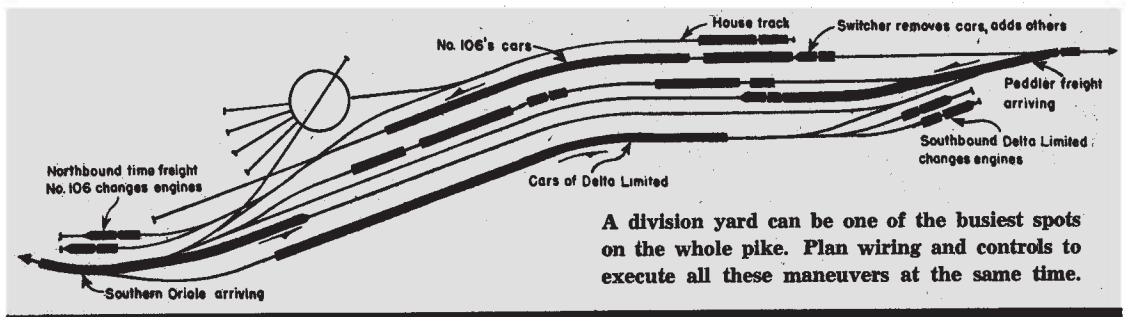
A division yard can be one of the busiest spots on the whole pike. Plan wiring and controls to execute all these maneuvers at the same time.

The *Art* of Model Railroading

Second of Six Parts.

The Track Is Your Setting, the Trains Your Cast of Players, and You Are the Producer. Learn How to Make Model Railroading Interesting by Using These New Ideas.

By Frank Ellison.

"ALL the world's a stage," said Shakespeare, and if we concede him to be right, then it follows that the effective operation of a model railroad is akin to good showmanship.

The arts of model railroading and of the theater really have much in common, for we dispatch trains, carry out mainline switching operations, organize meets—not as a matter of economic necessity as do the grownup railroads, but as an exhibition and for the joy and satisfaction of watching the little beggars do what we will them to do, like the marionetteer who pulls the behind-the-stage strings to put his puppet actors through a mimic play.

The more dramatic we can arrange these maneuvers, the more interesting this game of railroading will be. Later on, we shall show how the technique of good showmanship can be applied to model railroading to lift a mediocre procession of trains chasing their tails around a room into the realms of good theater, and do it without losing track of the fact that we are fundamentally railroading.

But having only now made the discovery that we are not only model railroaders but potential members of the theater guild as well, it seems high time we examine the old pike again, this time with one eyebrow cocked to appraise its theatrical possibilities.

The track, naturally, is the stage on which the play will be presented; the cast of characters is the trains themselves, each strutting and playing its part in a stage setting of bridges, tunnels, stations, lineside structures, landscapes and a cycloramic backdrop; the plot is the operating schedule; and you, my fine protean brass hat, are the playwright, producer, stage manager, and angel.

As the effectiveness of a play depends on the facilities of a well equipped stage and the props that can be used to carry out the illusion of reality, so the play of model railroading demands trackage arranged into main line, yards, sidings, and spurs so that this business of imitating a standard railroad at work may be presented accurately as well as dramatically.

The yards are the dressing rooms where the trains are "made up." We shall dismiss them for the moment and dwell on the main line: its length, character, design, and all the auxiliary features the actors need to present their play, for this is your actual stage.

A railroad, then, in its simplest form, is a main line connecting terminal yards. There are ramifications, of course, but this austere simplicity is the mischief with many model railroad layouts. The point is that railroads are much more than this. They transport passengers and freight in both directions from any number of places to an equal number of other places. The traffic originates in, and is also distributed, not only to terminal or division yards, but to a number of small towns, individual factories, mills, mines, warehouses, stores, docks, and an endless variety of other private enterprises scattered along the main line, with short auxiliary tracks to serve them.

To design a track system on which every train maneuver can be executed, and

Delivering a flat-car load of wood to box factory, with box car interposed so hot blast from the engine stack will not create a fire hazard to the building. Develop traffic all along the line at every conceivable point to build up tonnage for your pike.

to build it within the confines of the average train room, is no easy task. It demands all the cunning and ingenuity, trickery and bits of magic we can conjure. But do it we must, for it will be increasingly clear as we go along that track design is the very foundation on which the whole fabric of model railroading is built.

We should at least have a sufficient variety of facilities to banish forever the dull routine of trains running around the room with no work to do, like the smug and stilted wooden horses on a carrousel; and there is, of course, an irreducible minimum beyond which all but yard switching is impracticable. A run of not less than two scale miles seems essential. If your main line is not this long, a slight alteration in the design may create not only a longer run, but new routings and infinitely better opportunities for a whole new pattern of railroad maneuvers.

Traffic Patterns.

Splendid things can be done with all three standard types of track design, but of the three, the point-to-point system, beyond a doubt, is the closest approach to real railroad conditions, for on it, trains depart from a terminal to travel progressively and definitely to a real destination.

The Detroit Union RR. [April 1943 MODEL RAILROADER] is a good example of this type of layout, having large terminal yards for passenger and freight trains at one end, equipped with a turntable and wye and most terminal facilities, and a smaller terminal and reversing loop at the other.

Delta Lines is also a point-to-point system, having stub terminal yards of modest but adequate capacity, each equipped with turntable and wye for the turnaround of trains. A division point and yards divides the trackage into two divisions, which adds to the realism and the interest of operations.

Both railroads are otherwise well equipped with track facilities so that trains start from a terminal yard, travel over a simple main line, executing a number of maneuvers at passing sidings, way stations, junctions, and the like, to arrive, finally, at their distant destination, there to be turned and assembled again for return runs.

While the point-to-point system is an ideal arrangement, it requires considerable space for the two terminals; and when space is something we have everything else but, a continuous loop design is fertile soil to sprout a crop of trains for a whole new scheme of operation.

Thomas V. Jarvis took full advantage of a loop by locating a station at one end of his single yard which he called Stroudsburg, and another at the other end christened Scranton. Then by exercising his inalienable right to take off in a glorious flight of pure fantasy, the whole trackage became but a single division of a large trunkline railroad, and trains entering it at Stroudsburg traveled through the division to arrive eventually at Scranton, there to pass onward

View overlooking canyon near **Dodd Dam** shows track pattern at **Little River.** A sufficient variety of tracks will banish the dull routine of trains running around the room with no work to do.

true model railroader will have none of this, for he realizes that there never was and never can be a one-way railroad. The point is that trains must be dispatched from the single yard so that some travel clockwise and others counterclockwise.

But whatever the type of track design, trains traveling in both directions over the high iron require passing facilities, and your choice lies between double-tracking and making the pike single track with passing sidings. Let me suggest that if you choose double track, you are taking the wrong fork in the road and due to miss most of the fun, for single track makes infinitely better railroading.

One of the fine sights of a single-track line —real or model—is a meeting of two trains rushing at each other as if destined for a head-on collision. Then, one slows down, takes the siding and rolls to a deliberate stop; and the challenger, approaching the meet with the impetuous force of a projectile, clicks over the frogs with the sound of a stuttering snare drum, and flashes by the waiting train in a split second of crashing sound and motion. And almost before it began, the trains have passed and the slower one pulls over the points to resume her journey.

It goes without saying that the more passing sidings you have, the more trains you can keep working and the more thrilling the schedule becomes. The track design for one large layout, a point-to-point system with a huge 13-track yard and a 500 ft. main line, has but one passing siding. Five to ten could easily be added to that imposing stretch of track to increase the traffic flow to the point where several trains are running at one time: the swift expresses and red-ball freights to overtake the locals and slower-moving tonnage drags, and opposing trains to meet and pass in an ever-changing pattern of maneuvers as they progress, like the grownups, from the beginnings to the ends of their runs.

But double-tracking has its virtues. It would

to other and wholly imaginary divisions. In reality, a train, after completing its run through the division, would lose its numbered identity and when next seen on the high iron would be traveling under the alias of a new number.

The Canadian Great Western [March 1943 MODEL RAILROADER] is another cleverly designed continuous-loop railroad. The boys have gone a step further and actually divided their one central yard into two separate yards, each hav-

Thomas V. Jarvis' loop layout is operated as one of several divisions with Scranton at one end and Stroudsburg at the other end of the single yard.

ing its own drill and ladder tracks—a clever economy of space—and, not so incidentally, creating a track design that is at once a point-to-point and a continuous-loop route to be used as either according to the whim of the moment.

It is obvious that trains must travel in both directions on a point-to-point system and so the realism of two-way traffic is automatically taken care of. But the trouble is that operators of the out-and-home and continuous-loop designs often overlook this fundamental essential. Indeed, many articles have appeared in magazines offering signal and train-control wiring schemes that will operate correctly only if all the traffic moves in one pre-determined direction. Your

The **Canadian Great Western** has divided one central yard into two separate yards, each with its own drill track—a clever economy of space.

be a splendid thing to double-track the main line a short distance from one terminal (or from one side of the single yard) and consider it as a sub-urban district over which short commuting trains will shuttle on a hot schedule interlaced with that of the long through trains.
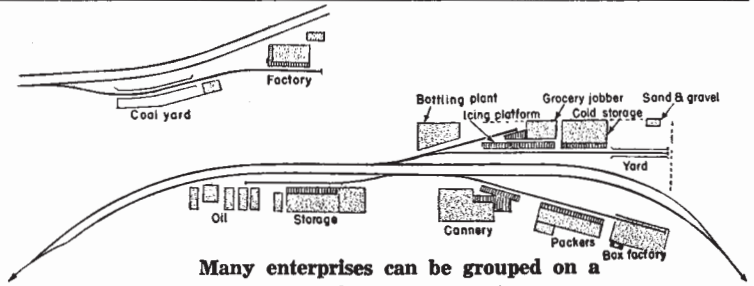
Many enterprises can be grouped on a few spurs to form a way-station group.

Developing Revenue Freight.

But as no real railroad can forever dispatch all trains in one direction, neither can they survive without developing traffic all along the line at every conceivable point.

This is the job for way freights, and occasionally the faster ones, too. You should have as many stub tracks branching off to such industries as you possibly can, for the more you have, the more varied and interesting this game of railroading becomes.

Delta Lines has a comparatively modest main-line run, but there are 20 spur tracks leading to private business houses grouped around the several passing sidings to form the nucleus of way-station groups and country towns. As several business houses can logically be strung along one spur, it is evident that dozens of

Curve between Louise Manor and Ginia. Trains progress from siding to siding over single-track main line. Never a dull moment!

customers for the railroad can be developed in a small space.

Mainline work for way freights is a thing of constant change forever challenging the ingenuity of their own and all the other train 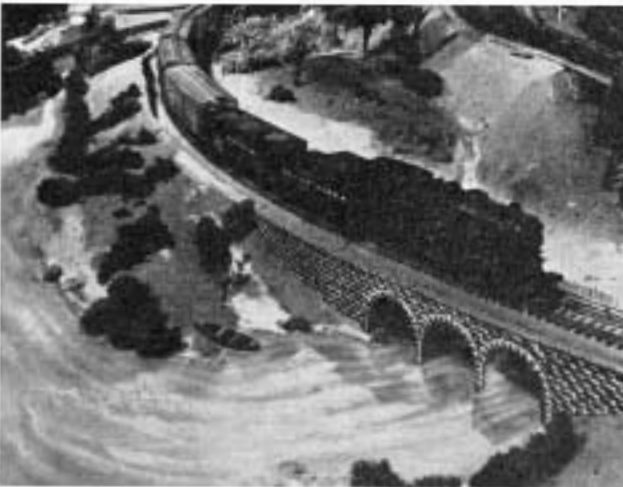crews, because, as we shall show in a later chapter, no two local freights shall ever have the same consist nor the same sequence of switching maneuvers. It becomes clear, then, that scheduled meets must be changed frequently or the trains run on "smoke orders," and the occupancy of the main line becomes a challenge to the good judgment of engineers and dispatchers alike.

If you have a branch line, or a choice of routes, there should be at least one short holding track at the junction. Here a mixed branch-line train may set out a coach or an express refrigerator car or a string of gondolas loaded with gravel from the pit up the branch. The mainline express will arrive, cut in the reefer and the coach, and speed onward. The way freight, too, will eventually stop to pick up the gravel and leave a string of empties for the branch train to take back to the pits. Give your railroad plenty of revenue business.

Do you have one of those sneak-off tracks leading to a hidden yard where trains are held in concealment to increase the apparent length of run? For the lova Pete, man, remove the camouflage and give that Shangri-La its place in the sun where everyone can see it and witness the splendid action that goes on there when trains are constantly arriving and departing. Call it a division yard if you wish, as we do on Delta Lines, for the functions of the two are identical. It's one of the interesting parts of the whole system.

This sums up the mainline track pattern—the stage on which the drama of railroading is presented. Ingenuity and good planning will make a short track seem long, one yard serve the purpose of two. A single turnout and a few feet of rail salvaged from a ripped-up stretch of double track can lead to a small secondary terminal yard and change the loop to a point-to-point line, or even add a few scale miles to the mainline run. No rail available? Have you considered the possibility of using wood rail for the short spurs where locomotives are not required to go?

(To be continued.)

Produce an Operating Schedule That'll Keep Your Model Railroad Audience on the Edge of Their Seats Till the Lights Go On. Good Showmanship, Proper Timing and Suspense Are Necessary.

The *Art* of Model Railroading

Third of Six Parts.

A meet at Gum. Northbound local is in the hole for southbound dispatch freight. Close timing adds dramatic interest, calls for good judgment and skillful handling of the throttle.

By Frank Ellison.

THE making of a model locomotive—a car, tracks, landscaping—comes, as it should, under the subject of model building. But the instant we start the first train to rolling along the track, we cease to be builders and step into the shoes of the stage director, for we strive with all our artifice and skill to make the train move about and perform in a natural manner: to start with the slow dignity that suggests tremendous power and weight in conflict; to accelerate gradually until the drivers and side rods telegraph speeds of 20, 40, or 60 miles an hour; to slow down for crossings, hazardous interlockings; to perform switching maneuvers *au naturelle*; and to brake and drift to a stop at a station platform with the deliberate, character-istic style of its grownup counterpart; aye, and to add a final touch of realism—to hiss a shrill whistle to imitate the escape of ported air from the brake cylinders. Yes, as surely as night follows day, we are staging a bit of acting—striving for realism in dramatizing the movements of the train.

It follows, then, that if one train's actions can be dramatized, so, too, can all the rest; and to coordinate the parts our actors play, to correlate their movements in a well thought-out presentation of railroad activity, we draw up a plan of action which eventually becomes a schedule of train movements planned to interest primarily ourselves and, incidentally, any audience of friends or visitors who may be "out front."

And so the schedule, whether or not we choose, is inescapably the dramatized plot of

the play of railroading. The point is that the plot may be either dull and lifeless or throbbing with interest according to our skill in planning it and the deftness with which we learn to execute it.

The chief difference between amateur and professional productions is good timing. The dramatist and stage director call it tempo, meaning a certain over-all speed or smoothness of movement.

Tempo has nothing to do with how rapidly an actor may talk or move across the stage. It deals, instead, with the smoothness with which the speeches and actions of the players blend and flow together; with the trick of mounting one emotion upon another so that one begins to build up before the preceding one has quite lost its vitality; with the cleverness of superimposing one situation on the heels of another; so that, in the end, the speeches seem eager and fervent and the action of the plot a thing of smooth, breathless movement. Good timing, then, among other things, is a matter of avoiding halting, jerky action, dull pauses, and stage waits.

We may borrow some of these tricks of the trade and use them to splendid effect in organizing a model railroad schedule. We shall, of course, follow the rules of good railroading in plotting the run of each train, maneuver it at the speed and in other ways characteristic of its class and type. But when it comes to coordinating the movements of all the trains in a schedule, we shall deliberately ignore most of the established customs of the grownups and create a set of our own.

The point is that real railroading is a serious business and its customs have been developed for the purpose of moving great tonnages of freight safely and profitably in order to sustain itself and our way of living. These are not the problems of model railroading and have no place in the basement domain. Model railroading is essentially an exhibition; and the moment we start to produce an operating program we are on our own, dealing with a whole new set

of concepts, conditions, and situations. It is clear, then, that the goals of real railroading and of model railroading are as far apart as the stars.

The grownups avoid hazards; we recklessly invent them. When a slow freight and a swift express are ready to leave a terminal at about the same time, standard railroad practice dictates the dispatch of the express first in order to avoid a meet with the slower freight at some point up the line. But it is a hundred times more fun in model railroading to start the slow freight first for the deliberate purpose of *inventing* a meet when the express overtakes it.

The big fellows strive to have their trains arrive and depart from large cities at the beginnings and ends of the days as an accommodation to passengers and shippers, and it follows that the traffic in midday is at low ebb or stopped altogether. Such an arrangement of trains would be fatal to a model railroad schedule where action, for the sake of our interest alone, should be distributed over the whole schedule period.

We have said that model railroading deals in a new set of conditions. It does: in shorter trains, shorter runs, smaller yards, fewer stations. With everything else foreshortened, standard time becomes awkward and cumbersome. If, for example, we space a second section 10 actual minutes behind the first, the first will have finished its run before the second gets started, so that we do not have a second section at all, but an extra train running on an entirely separate
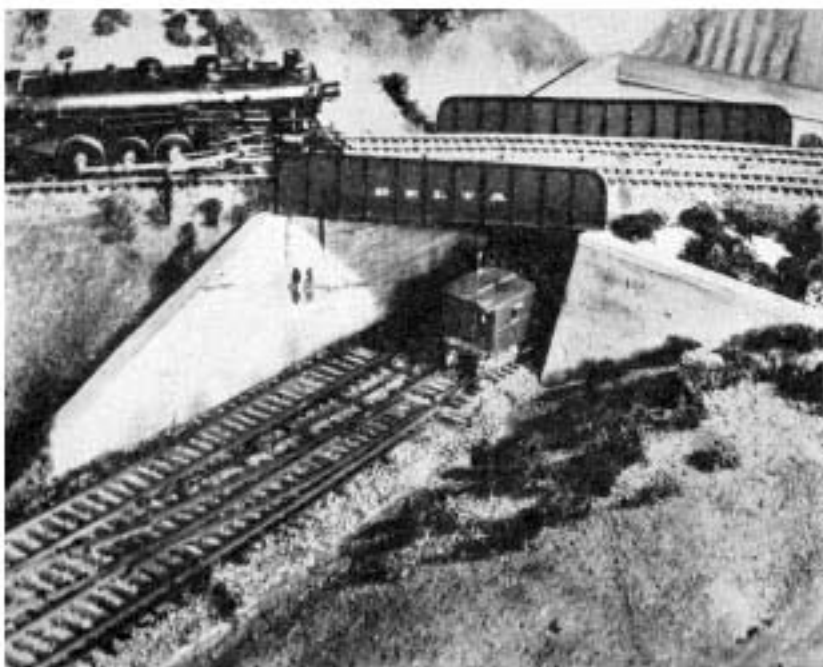
Black out a train in a tunnel while others take the spotlight.

Vista between industries at Donaldson. The Hudson bulks powerful, pulling her string of varnish through town as the little way-freight's engine waits in the hole for the meet.

schedule. Better spacing would be 25 or 30 seconds, with the trains separated by the interval of only one or two blocks.

So, too, in planning a meet, the customary 5- or 10-minute time cushion would be tedious on a model pike, for one train would be out of action entirely too long, and all the dramatic suspense of close timing utterly lost. A cushion of 25 or 30 seconds would be better here, too.

It is obvious, then, that real railroad time intervals are much too long to be applied to model schedules. They should be stepped up considerably to avoid a dull, sluggish tempo. Minutes should be changed to seconds. But reading time in seconds is not only awkward but absurd. Cluttering up a timetable with departures that read 12:20:53 would be droll, to say the least. Little Imogene is returning home from a visit to Aunty Bellum's plantation and wires ahead, "Meet me at three forty seven zero two." You would, no doubt, but with a psychiatrist and a straitjacket.

So to keep from going stark nuts and yet hang on to a shred of realism, we use the scale clock —any old eight-day relic from a junk or rummage shop (cost item, one buck) from which we remove the pendulum, shaft and weight so that it ticks merrily away with the speed of a telegraph sounder to register an hour in five minutes, one minute in five seconds. If there's

a second-hand on it, toss it in the scrap pile for your Uncle Sammy.

Once the scale clock is hung on the wall and given a winding, the 25-second spacing of first and second sections and mainline meets, without any mental gymnastics, becomes, for all purposes and appearances, a real five-minute interval; a 50-second stop at stations, 10 minutes. And it is as clear as a lucite window that a 10-minute run over the division would be stretched to two hours; for as all time is relative and our "official" clock says it is two hours, it is, in fact, two hours, and there's an end to it.

The thing is utter tom-foolery, isn't it? But the fellow who thought it up (and I'd like to know his name, bless him) salvaged the sanity of a nation of model railroaders. In scale time, *tempus fugit,* but it doesn't *fugit* as fast as a friend who has never witnessed scale-time operation thinks it does. He said, "To operate in scale time and think in standard time—*Oi!*" There's ample time for thinking and for executing nearly every maneuver in railroading. You may, without haste, change locomotives at a division point in a scale 10 minutes, set out or pick up a car on a siding in the same time, make a working stop at a station, wye a train at the terminal.

But good timing deals with more than a scale clock and foreshortened time. Dullness can be

caused by more tedious waiting on sidings and the like. Pointless repetition of trains shuttling back and forth without a purpose is one way. To be sure, they must travel up and down the main line, for this is the primary purpose of railroading, but the point is that no two need ever do it in the same way.

A dramatist will choose the characters for his play with a feeling for contrast, for contrast always has the effect of making each of the contrasted characters appear in a stronger light. Contrast a plodding way-freight with a sleek string of varnish; a lazy little three-car accommodation train with a high-speed fruit extra snaking its long string of yellow freezers over

Traffic elsewhere on the pike is slowed down as the long drag pulls out of the yards.

the grades; a stubby commuters' M. U. train, shuttling like a jack rabbit in quick bursts of speed and frequent stops, with a lumbering time-freight plugging steadily along at a mile-eating gait. Diesel-electric streamliners, standard expresses, logging trains; a solid train of express cars, mail storage cars; a milk train, work extra, cattle and ore extras; a troop train—the variety is endless, and each calls for specific

handling. These are the actors, and the way we contrast them to avoid dullness in the plot is all a part of this thing we call tempo.

A good showman would play up these contrasts—break up the schedule into a sequence of "ensemble" and "solo" acts, which is to say that the general action would quiet down at times in order to focus the spotlight on some particular feature.

These features may be the marshaling of cars into a consist at a yard; the arrival of a freight train and the attack of the yard switcher in breaking it up; doity woik at de roundhouse. They may be a complicated and cleverly planned mainline meet, the manipulation of a helper engine boosting a freight drag up Damit Hill, an exhibition of drawbar pull wherein your new Decapod or the articulated super-duper pulls 30, 50 or 80 cars over the grades; or a switching job at a mine, granary, way station; or changing locomotives at a division yard.

The point is that it is good theater to use feature acts as accents, and to introduce them with a certain amount of showmanship so that interest will be constantly focused on a parade of changing events.

The way to present that new locomotive with its long drag of yellow freezers would be to plan the schedule so that traffic elsewhere on the pike is slowed down or stopped just as the feature train gets under way in the yards and pulls through the yard gate to the high iron. The other trains, other maneuvers, would be dimmed out, so to speak, and the spotlight of attention focused on the star. And the engineer manipulating the train would toss in his bit of showmanship, too, by fingering the throttle so that the drivers slip a bit as the train is accelerating, to mimic the tugging pull of the engine in mastering the dead weight of the long drag.

A Strip Tease.

At any rate, we would be allowed to watch the spectacle of the long train getting under way, rounding the curve at the base of Collyer Bluffs, rolling into the gloom of Hyde Tunnel. But (and this is one of the secrets of good showmanship) before the keen edge of interest is dulled by prolonging the spectacle too much, you would blot it out by a flare-up of traffic elsewhere on the pike, for it is an axiom in show business to "always leave 'em wanting more." The thing is that a brief glimpse is better than a long look. Ask the strip-tease dancer.

We're not suggesting that you name that husky freight train Sally Rand and make all its yellow freezers blush a boxcar red. But if

you treat the episode as does the lady, you can bring the train back several times for other looks as it wheels over the division, and the interruptions, believe it or not, will increase the effectiveness of its run.

You can black out the train for a few moments while it is in the tunnel and other trains take the spotlight, then show it again as it rolls over the trestle at Goshwatta Gorge, and again dim

a fine schedule. The train is only one of several accents to be worked out. The action on the pike could very well resolve itself into a sequence of such situations. Another one would be the maneuvers of three trains at a meet, two southbound and one northbound. You would organize their movements to make it appear that all three were heading for a short siding just long enough to hold one.

This, suh, is as sure-fire a situation to arouse keen interest and suspense as watching the man on the flying trapeze do the "impossible." It's a saw-by meet, of course, and I'll leave it to you to work out the maneuvers in a railroad-like manner. The whole point is that as soon as it becomes apparent that you are actually going to be able to accomplish it, and before you have

A car can be picked up or set out on a spur in a scale 10 minutes without jerky action or haste.

it out with action elsewhere. Once more you can bring it to the front of the stage as it rattles over the frogs at the interlocking plant at Humdrum Junction; and still again blot it out with a switching maneuver over in the yards. Show it emerging from the smoky obscurity of the tunnel under Aboo Peak—bring it back for an encore again and again. You will surely think its run is many times longer than it really is, and the effect achieved will be highly dramatic.

But you need not build your whole operation around one train, for that would be sacrificing

entirely completed the maneuver and thus allowed the high pitch of interest to drop, you will have arranged to "kill the Kliegs" on the scene with action elsewhere.

This, then, is the meaning of tempo as applied to a model railroad schedule. It is the technique of good timing, good showmanship. It makes a swell exhibition if you have an open-house night or an annual show, but it's just as good if you work it out for your own entertainment—for you, more than anyone else, know the blood and sweat you have put into it.
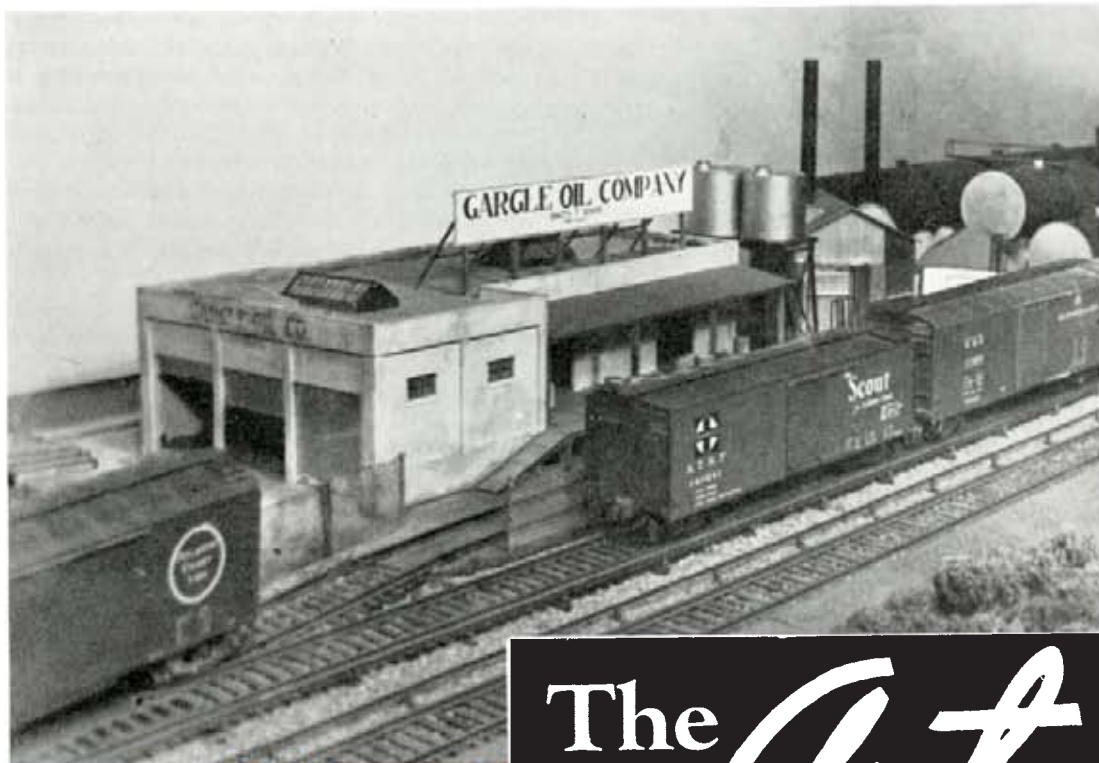
It will take about 10 scale minutes to set out a car on a spur track with switch points trailing in the direction of travel.

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By Frank Ellison.

RUMOR has it that Dr. Einstein's theory of relativity and curved space is so profound that few people can understand it. Heck, model rails understand it. They not only understand it but gave the world the first physical proof that space is curved and relative, and any model railroader can prove it with his own main line. His line runs from *A* to *Z*, which is miles and miles apart, or so he says. But what it *is* is the same darn place, for the track curves right back to where it started. And that's Einstein's theory in a nutshell—or should I say, on a model railroad. As for space being relative, well, what about "scale miles"?

Historical dates to the contrary, I have my doubts about who really discovered relativity. Dr. Einstein gets all the credit, but could it be that he had a crony with a scale model railroad?

At any rate, we should put a monument in Depot Square on every model pike in the world to the Einstein of model railroading, who not

Time and Space Are Relative. Theory by Eminent Scientist Is Applied to Model Rail Operation With Interesting Results.

only curved but shrank space—shrank a 5280 ft. mile to 110 ft. (okay, okay—62 ft. then, you in HO). He gave us distance where there was no distance, and with distance, layouts became railroads, and so showed the way to scheduled running of trains. For a railroad without miles is like an infantry without feet: it can't go anywhere.

If we are going to accomplish anything with schedule operations, let's haul out the Seven-League Boots (the yardstick you got from the

If you are allergic to the fact that a locomotive and eight cars will be one smile long . . .
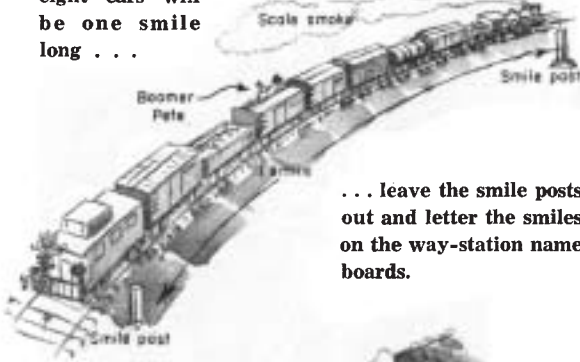
. . . leave the smile posts out and letter the smiles on the way-station name boards.

paint store) and measure the miles on the Anonymous Midland. Before figuring scale miles and scale time to produce scale speed, we must know the scale miles on the pike, not only from terminal to terminal, but between every station, every crossing, mainline crossover, bridge, tunnel, and any other points between which the trains will run and be timed.

Measure the distances first in feet, then, having tabulated these distances, reduce the footages to the nearest tenth of a scale mile. This is to say that if 110 ft. is one mile, then 55 ft. is .5 mile, 44 ft. is .4 mile, 33 ft. is .3 mile, and so on.

Let us suppose, for example, that the distance between stations B and C is 30 ft., actual measure. The nearest relative distance in tenths of a mile is .3 (33 ft.). As this is an accurate enough figure for operating purposes, we make permanent note of it for use in working up the time-
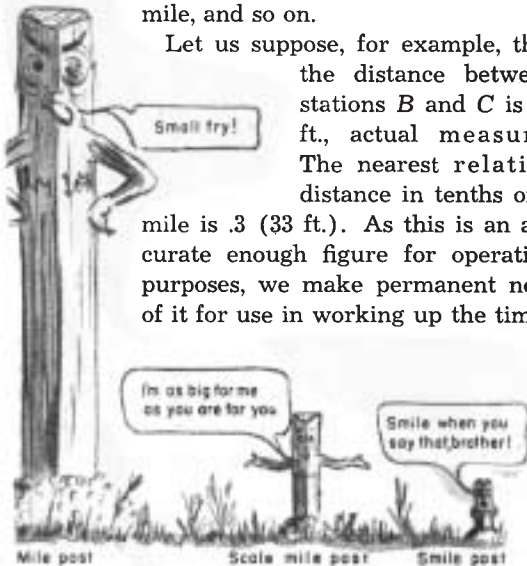
Sketches by Louise Ellison, mayor of Louise Manor.

card, and proceed to establish the distances in tenths of a mile between all other timing points.

We all know that a model train traveling at the rate of 60 m. p. h. will take one actual minute to traverse one scale mile. But the scale clock by which we operate a schedule registers time approximately 12 times faster than actual time, and this throws everything out of gear. For it is plain that the train will not take 1 minute to travel the distance, but 12.

The obvious solution, in order to preserve the fiction of realism, is to call our standard scale mile 12 miles and have done with it. The mile-a-minuter will then travel 12 scale miles in 12 scale minutes and the whole scheme of operation returns to a reasonable balance.

Divide the scale mile of 110 ft. into twelfths, marking off intervals of 9'-2" along the right of way. No one will argue that this is a scale mile, but just so visiting firemen will not take the thing too seriously, we shall avoid all controversy and call it a *smile*. The whole business of timing trains now becomes simplicity itself, for you simply gauge the speed of the train so that it will travel one smile in one sminute—er, minute.

But the smile does another thing; it stretches distance to greater lengths. The distance between stations B and C, instead of being only .3 mile, is now 3.3 smiles—a more plausible separation between stations. A layout having two scale miles of mainline travel will take on the dignity of a 24-smile line. From 220 ft. to two scale miles to 24 smiles! Jack's bean stalk was a piker.

If this seems like stretching the imagination to the snapping point, it isn't. It calls for no greater effort than to convince yourself that 110 ft. is a mile. Both are pure fiction, the one being based on relative lineal measure and the other on time measure.

We may use both without confusion, the purely model builders and nonoperators sticking to the 110 ft. mile and the operating fans to the 9'-2" smile. You may, indeed, use both on your railroad depending on whether you are looking in scale or running in scale, without any more effort than using both actual and scale time in the same train room and on the same night.

You may even synchronize the two elements—scale miles with standard time; smiles with scale time (is your tongue twisted?). Thus, you arrive at meeting, hold preliminary bull sessions, build or repair tracks, trains and scenery, make solo flights and test runs all by actual time and with a scale mile complex. But the instant you start the scale clock and begin timecard opera-

tion, you shed actual time and
scale miles as a snake does his
skin, and from that moment on
five minutes is an hour and the
pike is 24 smiles long. Simple,
isn't it. Or is it?

If you choose, you may even
install SMILE POSTS, but if
you are allergic to the fact that
a locomotive and eight cars will
be one smile long, leave the
posts out and just letter the
smiles on the way-station sign-
boards.

This scheme has no bearing on schedule op-
eration of trains except to reconcile time, dis-
tance, and train-speed. In figuring distances in
smiles, reduce both factors to inches and divide
the actual distance by one smile, carrying the
quotient to one decimal point, thus: The dis-
tance between stations B and C is 30 ft., which
is 360″. The smile is 9′-2″, which is 110″, and
we get: $360 \div 110 = 3.3$ smiles.

theatrical performance: the tracks are the stage,
the building and landscaping the setting, and
the schedule of operations the story. We have
shown how the principles of showmanship may
be applied to each to create an effective drama
of railroading.

Need it be said that the trains and locomotives
are the actors, and like most actors, have per-
sonalities? Certainly locomotives are tempera-

FIG. 1	TABLE OF SCALE SPEEDS						
	Clock Speed: 5 Minutes Equals 1 Hour.						
M. P. H.	Actual Time, (Use for Smiles)	Scale Time For Specified Distances					
		1 Mi. (110′)	.5 Mi. (55′)	.4 Mi. (44′)	.3 Mi. (33′)	.2 Mi. (22′)	.1 Mi. (11′)
		Hr. Min. Sec.					
90	40 sec.	8:00	4:00	3:12	2:25	1:36	:48
80	45	9:00	4:30	3:36	2:45	1:48	:54
70	51	10:18	5:09	4:04	3:04	2:02	1:00
60	1:00 min.	12:00	6:00	4:48	3:36	2:24	1:12
50	1:12	14:24	7:12	6:00	4:30	3:00	1:30
40	1:30	18:00	9:00	7:00	5:15	3:30	1:45
30	2:00	24:00	12:00	9:40	7:15	4:50	2:25
20	3:00	36:00	18:00	14:00	10:30	7:00	3:30
10	6:00	1:12:00	36:00	29:20	22:00	14:40	7:20

Seconds are not counted in scale time unless over 30, in which case add another minute.
Column 2 indicates SCALE TIME required for trains to travel ONE SMILE at above speeds.

The precise scale-time allowance for a train
running this distance at 60 m. p. h. is 3 minutes
18 seconds, but as seconds are not considered
in scale time, nor are tenths of a smile, we figure
three minutes flat for the run. By a little give
and take, the time for the over-all run between
several stations of varying distances will work
out close enough for practical operation. Fig.
1 is a table of time allowances for trains running
at various speeds.

Train Management.

We have said that model railroading is a

mental, and if not managed with kid gloves,
then at least they need pampering, coaxing and
wheedling to turn in a good performance.

I have two such temperamental stars—both
Hudsons. One is as sensitive to the throttle as
a thoroughbred to a flick of the reins. I can ease
back gently on the throttle and it will start with
all the fine, deliberate motion of its full scale
prototype, the wheels turning so slowly as to
be hardly noticed; and it will accelerate beauti-
fully and stop just as slowly as it starts. The
other one needs a quick, full surge of power
to overcome its inertia; an instant of high volt-

In the July Issue:

HOW TO BUILD AN
AUTOMATIC TURNTABLE

A simple inexpensive project

By Dr. B. W. Travis

age to be quickly reduced, a sort of jabbing thrust of the throttle handle. The drivers will spin a half or three-quarters revolution, then grip the rails, and at this precise instant the throttle must be adjusted to pass just the right amount of current to keep the engine moving. From this point the locomotive performs with fidelity to a scale start.

I emphasize this because we must understand the peculiarities of each locomotive and know how to cajole a good performance from it. For as we manage the engine, so we manage the train. A good automobile driver may fail as a competent model locomotive engineer until he learns to park his driving technique at the curb with his car. Trains must always start slowly, attain speed with a moderate rate of acceleration, slow down just as gradually, and stop with a long, gentle glide. Anything else is rough handling and spoils the performance.

Managing a train is more than mastering starts and stops. It comes from knowing all the track conditions of the main line. Before the engineer of a yard goat is advanced to mainline running on a real railroad, he must make a number of student trips over the division with a seasoned runner to observe how the train is handled; where to slow down for certain track conditions — crossings, junctions, interlockings; how the speed may drop to as little as 10 m. p. h. when climbing a long grade; how the hogger gauges his speed on curves, takes advantage of long level tangents and when dropping down grade to recover time; so that in the end, the train will arrive at the next station or timing point within a minute of being precisely on time.

He will become familiar with every highway crossing, the switching facilities in every town, the location of every private-owner spur, what to expect of bridges, tunnels and every conceivable hazard.

He will note, too, how the veteran times his highway crossing whistle so that the last lingering blast is sounding as the engine approaches the roadway; how, when a mile from a station, he will at times ask the operator with four short blasts "What's doing?" To the operator's answering signal with his train-order semaphore to stop or go ahead, he will acknowledge "Okay,

pal," with two short toots. When he has a second section tagging along at his heels, he will warn every station and tower operator and the crew of every train he passes with one long and two shorts.

As we learn all these things on our student trips over the Anonymous Midland, we also learn the personalities of all our trains, for there is a difference in managing the runs of an extra - fare express and those of the local freights. Let us suppose that you have been called to handle the run of a way freight over the division. The consist of the train will include a number of cars to be delivered to consignees at several way stations and private-industry spurs. You will be sure to find empties setting on house tracks and commercial sidings, and loaded cars ready for shipment from mills, factories and mines to be picked up and carried along to other way stations or to the division yards. Your run, then, will be a series of short spurts and frequent stops, delays encountered with a bad-order coupler, meets with other trains changed, all of which plays havoc with the schedule.

It is so difficult to maintain the semblance of a schedule for local freights on some roads that they are omitted from the master schedule and treated as extras to be run on dispatcher's orders. On other roads, however, switching from day to day will assume a certain predictable over-all pattern so that, within broad limits, the train may be expected to arrive at its destination at a uniform time, though its arrivals at way stations en route may vary.

This is your problem in managing the locals: to organize the switching maneuvers at each town and country spur so they may be executed smoothly and with as little loss of time as possible, to be ready to take siding when other trains are due in your vicinity and never to delay them for any reason. It is a run requiring good judgment, clear thinking, and a surety of handling which comes only from practice.

Mainline switching requires a wide latitude of time. Switching conditions at some points will favor southbound trains; at others, northbound ones. For instance, it will take about 10 scale minutes to set out a car on a spur track with switch points trailing in the direction in which the train is traveling, but 25 or more minutes where facing points are encountered. In time, the approximate number of trailing- and facing-point moves your train encounters in a run will assume a more or less standard pattern so that the schedule may be plotted accurately.

It is plain that time cushions must be allowed

for all these switching maneuvers—for meets, for station stops, for taking on or discharging a helper engine, stops at a division yard for a change of locomotives and yard switching—ample time, but not too much. The sum of these stops must be added to the time you have allowed for the train to make the run.

And so with a main line organized to handle a splendid pattern of traffic; with sidings and spurs and other auxiliary tracks strategically placed to make, in truth, a real railroad at work; with time and distance and speed, and all the rest at your finger tips; now—and only now—are we ready to plot the story of our play—the master schedule. We will go to work on it next month.

Southern Pacific Color Chart

Steam Locomotives

Cab exterior, black synthetic enamel.
Cab roof, black synthetic enamel.
Cab sash, not painted (made of aluminum or bronze).
Cab interior (except roof and floor), silver - gray eggshell synthetic enamel.
Cab floor (interior), black.
Cab roof (interior), light gray synthetic enamel.
Frames, main and truck, black.
Lettering and numbering, silver-gray exterior eggshell synthetic enamel.
Jacket, running boards, cylinder heads and cylinders, reservoirs, black.
Air-brake rods and levers, black.

Steam Locomotive Tenders

Tank exterior, black.
Frame and truck frames, black.
Wheels, black.
Lettering and numbering, silver-gray exterior eggshell synthetic enamel.
Steps, black.

Diesel Switching Locomotives

Exterior, black Duco.
Cab interior, ceiling and walk, green Dulux. Floor and all wood trim varnished.
Power-plant compartment, postal-car buff Dulux.
Undercarriage, underframe black.
Trucks, underframe black.

Daylight Steam Locomotives
(When Painted to Match Train)

Color scheme of engine and tender to include red, orange, and black painting with aluminum bronze trimming as follows:
1. Central band of orange color to extend around pilot and along running-board skirtings and walls of tender.

2. Two bands of red color to be applied on either side of central orange band, and to be separated from it by ¾″ width of aluminum bronze. Upper red band to originate at points on either side of boiler at running - board height approximately 10′-8″ back from the front of the smoke box. Top of band to be finished off with ¾″ wide aluminum bronze striping. Lower red band to originate at front edge of tender sidewalls directly under the lower side of the aluminum bronze stripe on the central orange band. Bottom of lower red band to be trimmed with ¾″ wide aluminum bronze striping.
3. Balance of exterior finish of locomotive, excepting smokebox front, to be painted black enamel.
4. Smokebox front, headlight case, headlight conduit, smokebox studs, to be finished with heat-resistant aluminum paint.
5. Classification lamps finished in aluminum bronze. Train number indicators finished in aluminum bronze, trimmed in black. Lettering and numbering to be done in aluminum bronze, with ⅛″ wide black border.

Conventional Passenger-Train Cars

Sides, ends, steps, interior of vestibules and handholds, olive green (Pullman green).
Roof and underframe, black.
Battery boxes and A. C. equipment suspended from underframe, olive green.
Trucks, olive green.
Lettering, gold leaf or gold-color paint.

Daylight Trains
Streamlined

Sides and ends, side sill to window line, also letterboard, Socony red.
Window band panels, orange.
Roof, side skirts, underneath equipment and trucks, black.
Lettering and striping, aluminum.
Handholds, polished stainless steel.

Lark Train
Streamlined

Sides and ends, also side skirts, two-tone gray (Pullman Co. standard for lightweight cars).
Roof, underneath equipment and trucks, black.
Lettering and striping, aluminum, except word "Lark" on side panels (orange).
Handholds, polished stainless steel.

City of San Francisco
Streamlined

Power and trailer cars:
Sides and ends, Armour yellow.
Roof, skirts, underneath equipment and trucks, harbor-mist gray.
Lettering and striping, bright red.
Handholds, polished stainless steel.

Freight Equipment

All except tank cars, freight car red (includes trucks).
Lettering, white.
Tank cars except gasoline cars, black.
Lettering, white.
Gasoline cars, tank, buff.
Underframe, trucks and safety appliances, black.
Lettering on tank, black.
Lettering on underframe and truck, white.

Work Equipment

All types of work cars, freight-car red.
Lettering, white.

Drovers' Cars

None.

The *Art* of Model Railroading

Fifth of Six Parts.

Percentage of Interest per Hour of Model Railroading Depends on Your Cleverness in Scheduling a Series of Operations Garnished With a Few Showman's Tricks Such as Suspense, Pace, Contrast and Climax.

By Frank Ellison.

MANY model railroaders braving the perils of the Deep South, suh, to see Delta Lines in its native lair, seem to think that operating a model railroad by timetable is some kind of cabalistic ritual.

'Tain't so.

Anyone can make a timetable, for it is but a simple guide by which trains are operated over a stretch of track. The thing is that little tricks can be conceived and introduced to make it infinitely more interesting than this, just as a finely carved cabinet is more attractive than a stack of plain pine shelving.

Model railroading is as much a theatrical performance as it is the mimicking of a railroad at work. If we are willing to give up the slavish duplication of some of the operations of the real pike and substitute little things from

> You will save time in drawing the vertical lines by using large double sheets of plain ruled book paper. The pale blue lines are $\frac{5}{16}$" apart. Ink over the hour lines with black ink; the 30-minute lines with red; the 15- and 45-minute lines with green. This makes for easy reading.

the showman's bag of tricks, the schedule will hold more interest for everyone.

We have said all this in previous chapters; stressed the importance of contrast, pace, suspense and climax; likened our tracks to a stage, the trains to actors, their travel patterns to the plot, and time as the coordinating technique—the four T's of model railroading: Tracks, Trains, Travel and Time.

These are the tools, and we shall use them as the showman does his. But no playwright can give another a rule-of-thumb system for writing a play, nor can a model railroader tell another to do thus and so to produce a successful timetable for his pike. Broad principles may be laid down and examples of technique illustrated for use as a guide, and it depends entirely, then, on the originality, the ingenuity, the downright cleverness of the schedule builder to apply them to his own road with his own set of ideas to produce an original schedule of his own.

The Master Chart.

The simplest way to go about building a schedule is to do as the real railroads do: plot

> Chart for an out-and-home layout. Stations named with prefixes East and West are the same points on the stem track and so named to clarify the route of a train. Those between East and West junctions are on the loop position of the layout.
> Westbound trains leave Easton and travel to East Junction, thence via Arcadia to West Junction and back to the starting point at Weston. Those running eastbound leave Weston and upon reaching West Junction are routed through Elbow Bend to East Junction and so back to Easton.

FIG. 1-A.

SHANGRI-LA 13
AC TOWER 22
SP CROSSING 16
ST. MICHAELS 41
Distances in feet
RAYMONDALE 26
ROMMEL'S RUN 5
HUMDRUM JUNCTION 21
ROWLAND'S PEAK 22
LIME SPRINGS 27
SICILY FALLS 28
DC TOWER 12
CASABLANCA

FIG. 1-B.

WESTON
WEST BAY
WESTERLY
WEST JUNCTION
loop
ELBOW BEND
FROG HOLLOW
HOHUM
ARCADIA
EAST JUNCTION
EASTERLY
EAST BAY
EASTON
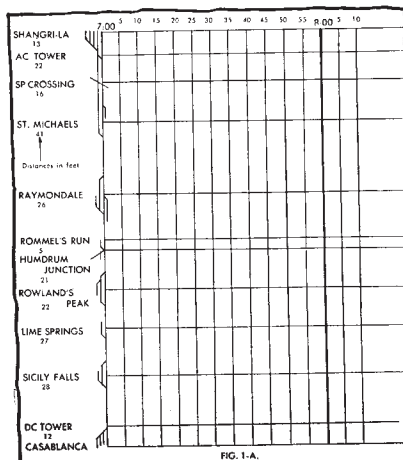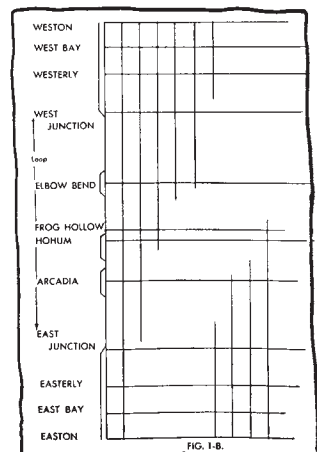
the whole action on a graphic chart. Then, if you choose later on, you can transfer the stations and times of the trains to a mimeographed or printed timetable, though this is not necessary.

A preliminary six-hour chart may be ruled in black ink on a sheet of bristol board 18″ high by 22″ wide. Thumbtack or scotch-tape a sheet of tracing paper over it on which to plot the train movements in pencil lines so that errors can be corrected and changes made without spoiling the chart.

Preliminary operating tests of the schedule will suggest improvements, and you will introduce new situations as they occur to you and as the engineers become proficient in handling the trains. Your road will be a laboratory for experiments and surprising things will be worked out. Then, when everyone agrees that the schedule is as good as it can be made, make a permanent chart on large sheets of plain ruled book paper, transfer the train graphs to it, using colored pencils to make their identification easy, back it with heavy cardboard, and mount it on the wall for ready reference.

The chart is made up, as you know, in a criss-crossed pattern of vertical time lines and horizontal station lines. Space the vertical time lines 5⁄16″ apart to conform with the spacing of the lines on the book paper. These will represent five-minute intervals for as many scale

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Want To Know How Fast Your Train Is Running?

Count the number of cars of average length passing a given point in 5 seconds actual time.

No. of Cars in 5 Seconds			Speed— Miles Per Hour
2 cars	indicate	12.27
3	″	″	18.41
4	″	″	24.54
5	″	″	30.68
6	″	″	36.82
7	″	″	42.95
8	″	″	49.09
9	″	″	55.22
10	″	″	61.36
12	″	″	73.64
14	″	″	85.90

Fig. 2.—Speed Table.

Use this table to determine speed per **scale mile**, using **actual time** or speed per **smile** using **scale time**.

Miles Per Hour	1 Mile in		Miles Per Hour	1 Mile in	
	Min.	Sec.		Min.	Sec.
6	10	0	55	1	5
10	6	0	60	1	0
15	4	0	65	0	55
20	3	0	70	0	51
25	2	24	75	0	48
30	2	0	80	0	45
35	1	42	85	0	42
40	1	30	90	0	40
45	1	20	95	0	38
50	1	12	100	0	36

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hours as you choose. Use a scale of 32 feet to the inch and space the horizontal station lines in proportion to their actual distance on the layout.

It is customary to assign the top line to the northern (or eastern) terminus and the bottom line to the southern (or western). The same applies to the continuous loop layout, for here we assume that trains running north will end their runs as they enter the southern end of the yard.

Identify each station by name, each tower by sign, and any other timing point by mile number on the margins of the chart, and insert their distances in actual feet, scale miles, or *smiles*, as you choose, between them. Draw a schematic track plan on the left margin showing single and double tracks, passing sidings, spurs, yards, crossings and other factors affecting the maneuvers of the trains (Figs. 1-A and 1-B).

Trains are plotted by drawing lines which start at the left and run diagonally up or down to the right according to whether the trains travel north or south. All we have to do to plot the run of a train, which we shall say is 36 *smiles* (330 ft., or 3 scale miles), is to select its starting time at either terminal, decide arbitrarily its rate of speed, then, by consulting the speed table (Fig. 2), determine the elapsed time needed and so its hour of arrival at the other end of the line.
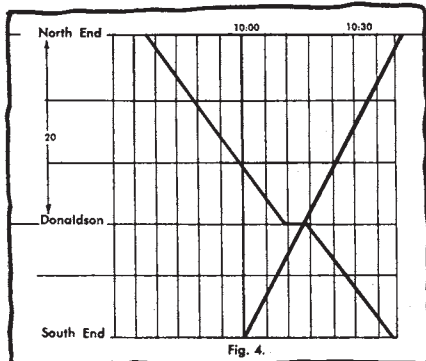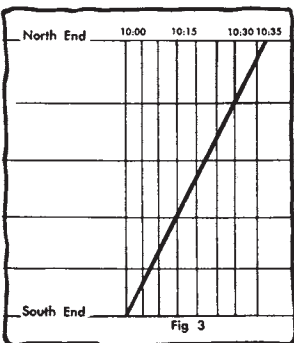
Believing that the use of *smiles* is a more convincing unit of measure to use when operating the railroad than scale miles, distances between stations are here so indicated, thereby bringing into uniformity the coordinates of time, speed and distance. [See Smile Posts, June MODEL RAILROADER.]

So then, for example, our train will start from the southern ter-

Fig 3

Fig. 4.

Read the August Feature
SUPERELEVATIONS AND SPIRALS

and learn about banking curves.

By John J. Tigert.

minus at 10 a. m. and travel northward at 60 smiles an hour. The speed table shows that it will take 36 minutes to make the 36-smile run (easy, isn't it?), so we draw a line from bottom to top, beginning at the 10 a. m. line and ending just to the right of the 10:35 line (Fig. 3), and instantly the whole course of the train is plotted and we know its location at every minute of its run—the time it passes every station, passing siding, tower, crossing, junction or crossroads.

The moment we enter a second train on the schedule, we are confronted with the problem of its travel in relation to the first, and we must

Here is a model railroad at work. Study it carefully. The schedule can be worked with as few as four men, a minimum of four engines and one streamliner.

not for a moment, lose track of the fact that the movements of the two will eventually conflict as they approach a common meeting point. We must be sure that this point of meet will be on double track or at some suitable passing siding. So we plot the second train, which we shall suppose is a southbound train running at 40 smiles an hour, which, like the first, will be nonstop except for the meet. We must now work backward from a selected meeting point—let us say at Donaldson, 20 miles from the northern terminus. The speed table shows the 40-smiler will take 30 minutes to reach the point of meet from the north end. To this, we add 5 minutes more for a cushion to give the train time to take the siding before the other one arrives, and we count back 35 minutes from the time the first train is due at Donaldson to determine the departure time of the second train from its northern terminus, and chart its course from top to bottom (Fig. 4).

But too many nonstop runs will be a boring ring-around-the-rosy. Most trains will have work to do, stopping at stations for varying lengths of time. A local passenger train will stop at every station and its graph will show

FIG. 3.

the stops. Local freights, too, will stop for longer periods to unload package freight from the house car, to pick up or set out cars on private spurs, etc. The graphs will become a series of steps, for, of course, the lines will be horizontal at these stops. In the end, the chart will look something like Fig. 5.

A simplified copy of the Delta Lines master chart is shown on page 306. Space on these pages does not permit showing all of its complexities, but we can enlarge certain sections in order to see and analyze the maneuvers, and discuss the effects striven for.

We shall assume that the switch crew in Chappelle Yard has been working the graveyard shift, sorting cars into groups, marshaling them into train consists according to instructions on their switch lists. The first trains to leave are now made up and ready. They are a local freight, a passenger accommodation, and an extra-fare high-speed streamlined express.

If we were operating a real railroad we would start the faster trains first to avoid meets, but we are not. We are model railroaders, and this kind of dispatching would be a dull and boring routine. Our concept for model railroading demands more action. The more meets, the more interest; the closer the timing, the more dramatic and entertaining the pace. So we reverse the order of departures and start the local freight first, followed by the local passenger and then the streamliner. We'll tell you now that the speed limits for their respective classes are 30, 60 and 80 smiles an hour, which, of course, are entirely within the rules of standard practice.

Starting smack on the nose at 7 a.m., we plot the course of the local freight. The run from Chapelle to Louise Manor, its first stop, is 10 smiles (how much better this sounds than .8 mile!) and the time chart shows that at a speed of 30 sm. p. h., we have 20 minutes to make the run. So we draw a line starting at the intersection of the Chapelle and the 7 a.m. lines to run diagonally upward to the intersection of the Louise Manor and 7:20 a.m. lines (Fig. 5). The train will have switching to do here—set out and pick up cars from the house, interchange or layover tracks—so we leave it for the moment to consider the graph of the second train, No. 8, the local passenger. This train will make stops at every station, averaging 2 minutes to each. There are three between Chapelle and Louise Manor, a total of 6 minutes. Traveling at 60 sm. p. h., the train will need 10 minutes to make the run, plus 6 minutes added for the stops, or a total of 16 minutes.

A little consideration of the situation shows that if we start the train from Chapelle at 7:08, it will arrive at Louise Manor at 7:24, just 4 minutes behind the freight. That's just 20 actual seconds, and you can begin to see this thing we call dramatic tension taking shape.

But more is to come: that speed demon, the Diesel-electric streamliner—No. 36 on the schedule—champing like a race horse at the barrier; waiting for the green eye hanging over Track 4 to be off on her 80 sm. p. h. nonstop dash over the division. Being nonstop, we figure the total smileage from Chapelle to Colbert. This is 22 smiles and the speed table tells us the run can be made in 16½ minutes.

The situation at Louise Manor shows that a line drawn through there at about 7:28 a.m. is just about perfect for one of those "suspense and climax" situations we've been talking about for a couple of chapters. It means that No. 36 will be tearing like a streak of greased lightning through Louise Manor just 5 minutes after the accommodation tucks her rear end into the siding. It means a three-way meet with timing so close the two rear brakemen on the locals won't

FIG. 6.
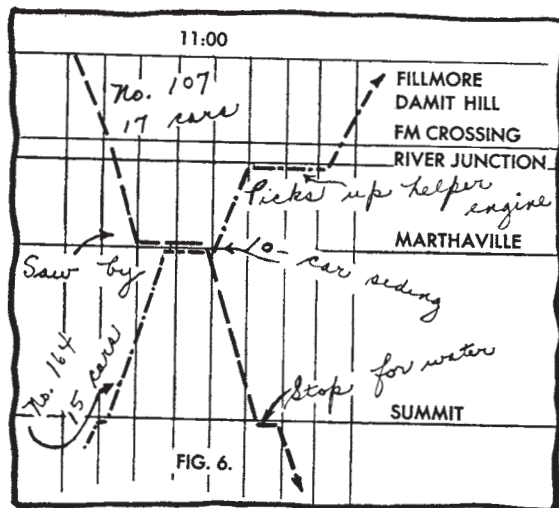
Two long freights saw by at short siding.

have any time to chew the fat. They've got to snap the points over pronto to clear the main stem, for that streak of canary yellow is bearing down on 'em at 80 per and just 5 smiles back. So we draw a line, straight as an arrow, from 7:20 a.m. at Chapelle to 7:37 at Colbert, the line crossing the Louise Manor line exactly at 7:28.

Some few operating nights hence, No. 36, in the flesh, will come tearing down the tracks to cleave its way between the two waiting locals,
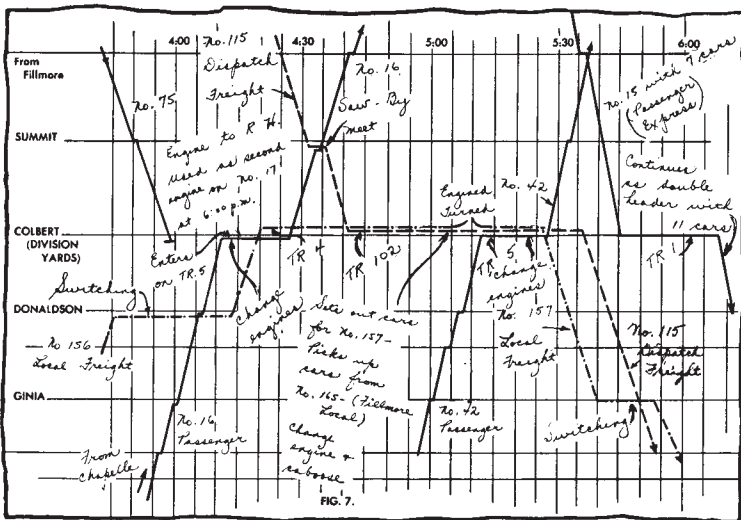
Peak-hour traffic at division point.

and if everybody has been on his toes and has done the right thing at the right time, it's going to be as pretty a piece of coordination as you'll ever want to see. It's all in Fig. 5.

The meet accomplished, we turn again to the local passenger, No. 8. It regularly cuts in the breakfast diner at Louise Manor and we allow 12 minutes for the maneuver and mark its departure for 7:35. It will stop at several stations en route to Colbert (division point). Here, 18 minutes is allowed for a change of locomotives. On its run through the second division, it has several additional station stops. The sum of these times will be added to the actual running time and the train schedule is built up in the same simple way as we did the first part of its run to Louise Manor.

Trains do not rush around the tracks in a helter-skelter of speed. Only those whose prototypes call for fast schedules run with a wide-open throttle. Stops and starts are gradual;

Schedule for commuter zone, super-imposed on through train schedule (through trains indicated with dashed lines).

switching is slow. The local freight has 37 minutes to carry out its switching at Louise Manor, then 3 minutes to make the run to Ginia, where it has more switching, and so on through an hour's switching at Donaldson and to the end of its run at Colbert.

There's much to admire in following the work of a long freight jogging along at 20 to 30 sm. p. h. A coal extra leaves Fillmore yards at 7:05 a. m. An extra, of course, has no business on a master schedule. We draw it in here only to illustrate a run of another kind. Extra No. 2345, consisting of engine No. 2345 and caboose, leaves FM yards carrying white flags and runs light to River Junction and the Raymond Colliery switch. Here it backs down to the coal tipple and has 50 minutes to make up a train of loaded hoppers and gondolas. The engineer must watch his time, for during the maneuver, No. 36, now nearing the end of its run to Fillmore, is due and he must be in the clear for the meet. Getting its clearance at River Junction, the extra carries orders to take siding at Marthaville for northbound No. 8, and at Summit for southbound No. 19. It arrives at Colbert at 9:08 and threads its way down a cleared alley in the midst of much other activity.

For contrast of another kind, there's some dual switching of two freights at Donaldson between 8:15 and 9:19 (Fig. 5), described in the March MODEL RAILROADER. Notice how the graphs of the two trains have been planned to converge here, No. 106 overtaking and passing the slower Peddler.

No. 106 is a long dispatch freight and it is a fine sight to see the long drag picking its way through a network of switches, climbing a grade, winding around a rocky ledge, plunging through a dark tunnel, crossing a canyon on a high
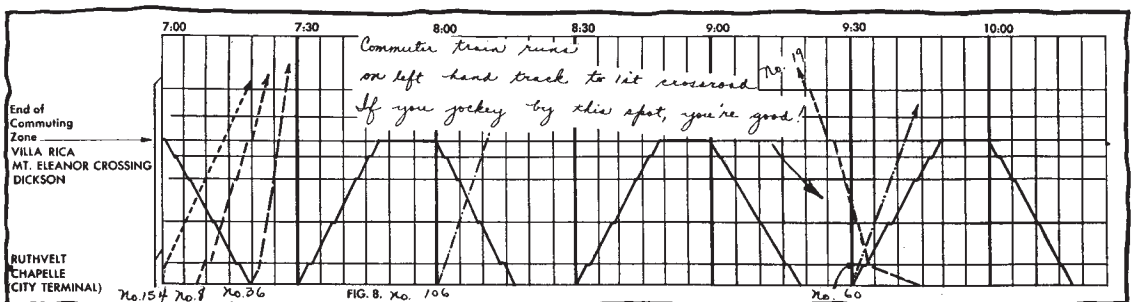
bridge, wheeling through a small town. It is worth some time to follow its route on the chart (Fig. 5) to observe how its run is timed at these scenic spots to spotlight it when other traffic is stilled or at low ebb. [May MR.]

Other things are to be seen on the master chart. A coach is set out at Mt. Eleanor Junction at 9:15, and a few minutes later the branch train (not shown on the chart) picks it up for a short run to Center Island.

Ten minutes is allowed at River Junction for all heavy northbound trains to take on a helper engine for the climb up Damit Hill. The hill is not shown on the chart but lies between FM crossing and the Fillmore Yard throat. The helper shuttles up and down the hill, running head-first with a train, then drifting back down to RJ tender-first, there to go in the hole on a short spur to await its next assignment.

Between 4 and 6 p. m., the activity in the Colbert (division) yards is a continuous play of action (Fig. 7). No. 75, a southbound local passenger, arrives on Track 3 to end its run. No. 16, northbound express, pulls in on Track 5 for a change of engines and continues north, but while it is still in the yards, No. 156, a way freight from the south, ends its run on Track 4 and its Consolidation engine is turned for a return southerly run with No. 157 to Chapelle. During the maneuver, No. 115, a double-headed

fruit dispatch with 20 cars, pulls in to Track 1 from Fillmore, its last nine cars immediately cut off and switched to Track 2 to join the consist of No. 157, the local, which leaves at 5:26. The dispatch, picking up several new cars in the yards, continues its southerly run with one engine 9 minutes after the local to pass it at Ginia at 5:49. The streamlined Southern Oriole, No. 42, arrives and departs during the heat of the switching by these two freights, and finally No. 15, Sundown Flyer, arrives with 7 cars and leaves with 11 as a double-header.

The whole point of the thing is that the chart shows a graphic picture of activities at every minute, the picture of a railroad at work.

But running, as diversified as it is here, is not all. Bunching a string of cars together to make a train and sending it out to perform the same old routine and sequence of switching time after time is not yet the real stuff. Every train that leaves a terminal should be like a ship sailing with a new cargo: the makeup and the list of consignees should be forever new. But attractive as this prospect is, the fun of model railroading should not be drowned in a sea of switch lists, manifests, and other endless forms. As near as possible, it should be a card-index railroad, *sans* pencils, *sans* office work—*sans* work, period.

Coming up next month: Hoggers.

Construction Kinks

Window-Cutting Guide.

THE sketch shows the construction and use of a guide that works perfectly for cutting out windows from card stock. It should be made from a fairly heavy gauge of tinplate or brass. The window openings are cut slightly forward and beveled from both sides and the lips are bent both forward and back so that the gadget

Full height of side

Bend tabs front and back
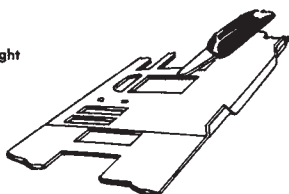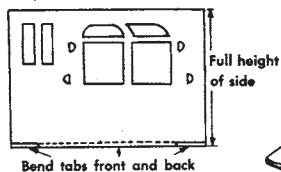
is reversible. Any combination or length of window can be obtained by manipulation and the use of small stops cut through the mullions. It is not necessary to cut the side to height, as it can be cut off as the guide is moved along the sheet. However, it is advisable to trim the edge of the card after each side is cut off.— *Charles F. Morsch.*

Useful Material.

KOOL SHADE is the trade name of a miniature metal venetian blind material put out by Ingorsoll Steel & Disk Division of Borg-Warner Corp. Very useful for louvers in locos, model venetian blinds, etc., it is also a fine source of flat bronze strapping for tanks, boilers and the like. The material costs about 60 cents per square foot. To locate your local agent, contact Borg-Warner Corp., 310 S. Michigan Ave., Chicago.—*Billi Bowen.*

Finding Short Circuit.

ONE way of tracking down a short circuit on a D. C.-operated layout is by placing an inexpensive compass on one of the power rails of the track. Give the system a short, quick jab of power. If the compass needle revolves wildly, the short is at some point beyond the point where the compass was placed. If the needle does not react, the short is not in that section and should be tried in a different spot. —*John J. Mulholland.*

The *Art* of Model Railroading

Last of Six Parts.

On Operating Night the Train Consists Are Made Up From a Stack of Cards.

By Frank Ellison.

THE long, muffled note of a distant whistle floats through the still noonday air of Raymondale, stirring up activity around the station. The afternoon local freight is bowling over the long trestle a mile north of town.

Engineer Keating cuts his steam and drifts into town, brakes grinding, coupler knuckles clanking, and brings his cavalcade of bobbing cars to a stop with the caboose opposite the station platform.

Conductor Peak drops off the caboose steps and greets the agent: "I've got a car of coffee for the Sanky-Wanky Coffee Co., Norman, and that empty you wanted for the Sally Patica Co. Got anything for me today?"

"Well," Norman answers, "that reefer is iced. You can pull it from the icing platform and spot it over on the Irradiated Eggplant track for loading. And those three flat cars you left at the sawmill yesterday are loaded. Run down the Humdrum Lumber Co. spur and pick 'em up."

"Set out two, switch one, and pick up three," mumbles the conductor to himself; "that'll take 45 minutes." And to the agent, "How's 74? Running 20 minutes late? Guess we can clean up here and get down to the junction for the meet."

Of course, there's no station agent, no train crew, no conversation. No hunkies tumble ice into the bunkers of the refrigerator car and no coffee is roasted at the Sanky-Wanky coffee mill. In fact, there are no people living in Raymondale, except in whimsy. But the town is a real town, the tracks are shining ribbons of honest steel, the trestle is a thing of braced timbers, and the train is a real train—real in every way except size, for this is a scale model railroad.

The train will drift into town, stop at the station, do all the switching of cars under the throttle hand of Hogger Keating — but Keating will be at a distant control panel, and the people and their conversation will be the fanciful imagery he conceives to bring the whole scene to life.

For the switching, let there be no mistake, like the maneuvers of the big brother train he imitates, will never be the same on any two trips to Raymondale or any other station along the division.

The makeup of every freight train in the yards will be a new concept, its string of cars a new arrangement; and the cars, themselves, consigned to an ever-changing sequence of consignees and station destinations. Once out on the main line, the locals will stop at stations to deliver these cars as the sheaf of waybills direct; and they will receive instructions from the mythical station agents as to what cars to pick up and where to haul them as they progress from town to town.

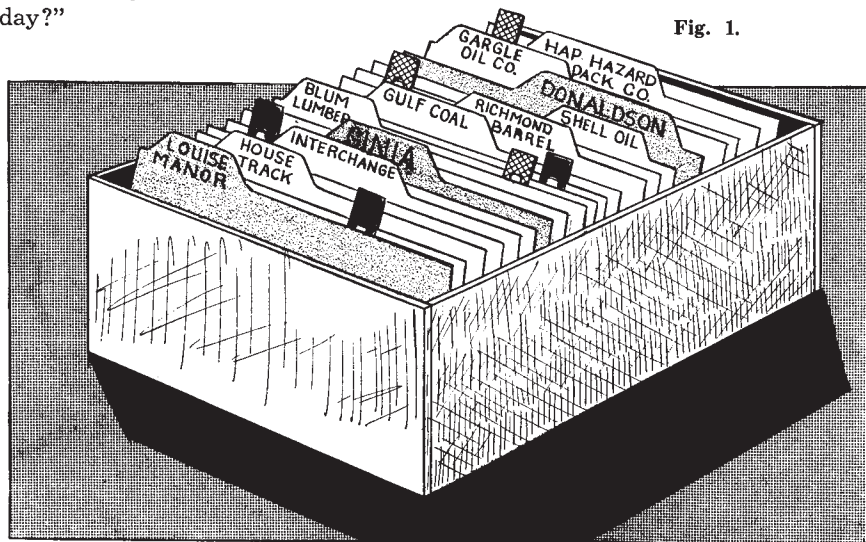No. Not once in a thousand runs will the

Fig. 1.

same combination of cars be shunted and shifted in the same program of movements to the same combination of tracks. Every trip will be a new adventure. New switching problems will be encountered and solved, calling for smart thinking and initiative. Scheduled meets with other trains must be canceled and new ones planned. The use of the main line will often be a matter of hair-trigger decision. In fact, the little beggars will stir up more action than a catfish in a school of minnows.

We use local freights on Delta Lines. They are the feature trains of the schedule. Ridiculous, isn't it? Engineers scrap for the right to run them. Boys don't give two hoots of a Lionel whistle for those nonstop flyers.

But all this shuffling of cars would seem to entail an endless amount of figuring, writing, and filling-in of forms. Indeed, your real railroad man would begin to lick his chops in delightful anticipation, for nothing is as dear to him as a desk full of forms and an indelible pencil.
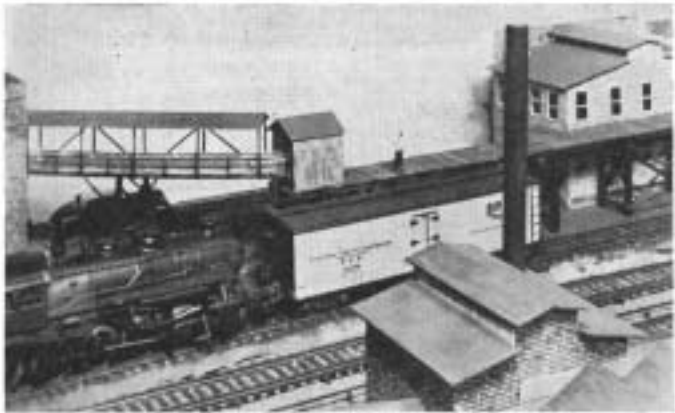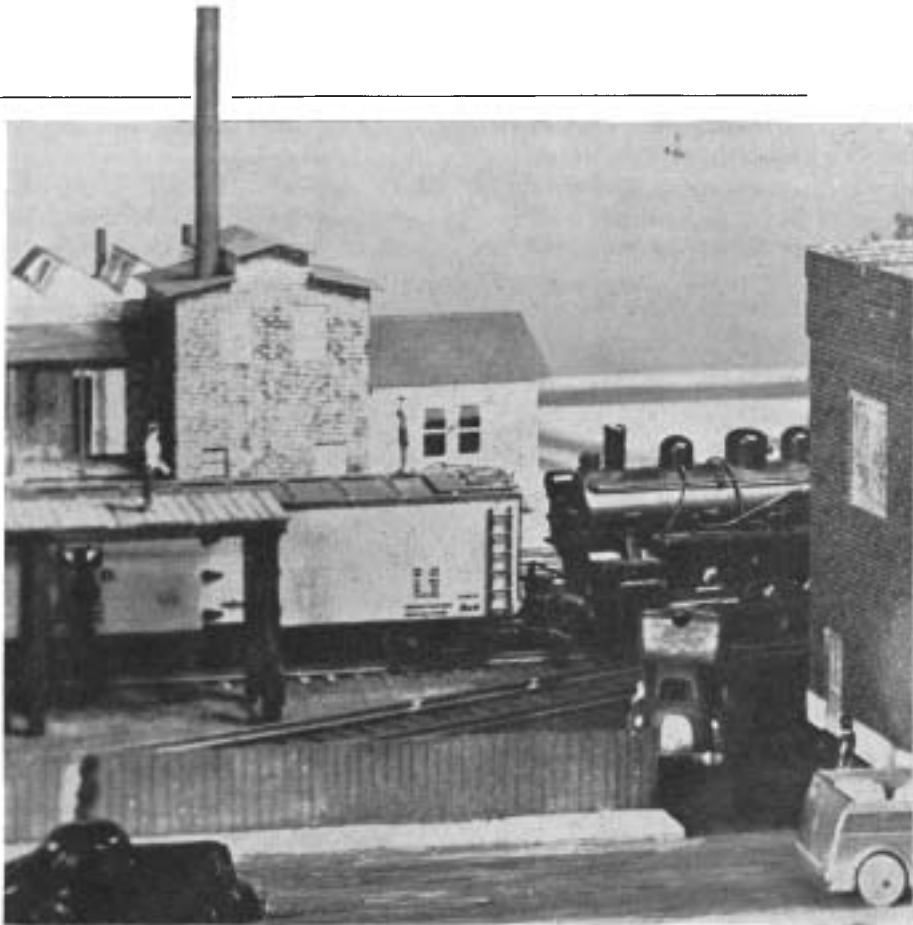
"As he goes along from town to town, he picks up or sets out cars, and for the cars he sets out he leaves a card in the correct compartment in the mainline box. For those he picks up, he removes the card from the mainline box and adds it to his consist pack."

The mischief with this is that no model railroader wants to be tripped up in a tangle of paper work. Why should he? Model railroading is a delightful hobby, a laboratory for experiment, an escape from the hazards of everyday living, and we should keep it so. Forms? Perish the thought!

CH	DX	VR	LM	LR	GA	PW	DN	CO
		HOPPER	• C & O	27359				
Oiled - 3/12/43		5/21/43		7/10/43				
New coupler 2/5/43								
Replaced wheel 6/20/43								

Fig. 2.

Here's a lazy man's substitute—a little game of put-and-take played with a stack of cards to take the place of all those switch lists, freight bills and train consists; a pencil-less way to have a graphic, running record of car routings, destinations and dispositions. Once started, you can change every last dad-blamed car on every gol-darned train and leave all the pencils at home. And if it isn't the simplest system you ever heard of, send me your last year's fedora and I'll eat it.

This is it: Raid the stationery counter at the 5-and-10 and collect two packets of plain ruled 3 x 5 filing cards, a set of *white* (plain or alphabetical) index cards, a set of *blue* (plain or monthly) index cards, a letter-size sheet of thin pink or other colored cardboard, one or more of the 25-cent cardboard filing boxes to fit.

And from the stationer or office supply house: a box of mixed red and blue Moore's (or other brand) filing card "signals." These are small metal tabs that slide over the tops of the cards to stick up about ½".

All set? Well, then: (*a*) Assign one plain ruled card to each car on your roster; (*b*) one *white* index card to each shipper, industrial spur, house track, interchange track, layover siding, and storage yard; (*c*) one *blue* index card to each terminal yard, division yard and way station. Name them car cards, shippers' cards, station cards, respectively.

Lettering Is Simple.

On each car card, letter the sign letters of each terminal, division yard and way station across the top, thus:

CH	DX	VR	LM	LR	GA	PW	DN	CO
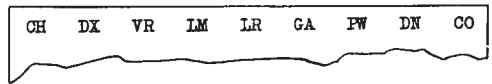
and below, write in the reporting marks and type of car: PRR 123456—Box.

Letter the full name and the sign letters of a way station, terminal, or division yard on each of the blue station cards like this:

Chapelle   C. H.

Print the name of an industry, house track, interchange track, storage siding, or yard on each of the white shippers' cards this way:

Humdrum Lumber Co.
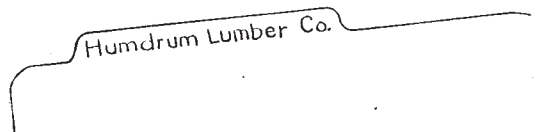
In the end, every car, every station or main yard, and every track where a car may sometime be consigned or stored will have a card of its own. Cut up the *pink* sheet into a number of tabs 1" square, set them off in pairs, and letter the name of an industry, house track, etc., on a pair, so that there will be two sets of all these destination points.

The number of filing boxes needed will depend on the organization of your railroad. If you have one common yard serving a one-division, continuous-loop layout, and you do your own yard switching as well as operating trains over the main line, you will need but one box in which to file all the cards. On the other hand, if your pike is a point-to-point system with two

Richmond Barrel Mfg. Co. at Ginia.

CH	DX	VR	LM	LR	GA	PW	DN	CO

BOX CAR - L&N 32507

Fig. 3.

separate terminal yards and, perhaps, a division yard, then you will need five boxes: one for each of the principal yards (we shall call these boxes yard boxes) and one for the group of way stations in each division (called mainline boxes).

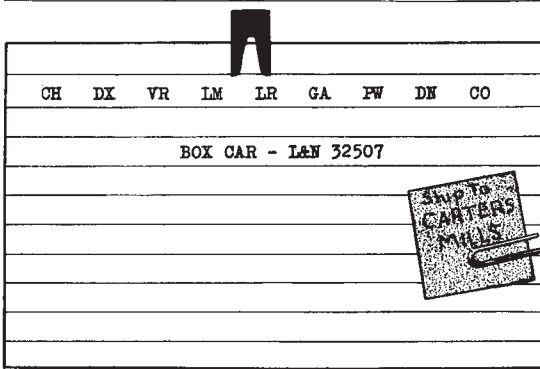This is your whole equipment for "office work." With this simple lettering accomplished, there will be no need for any figuring, writing, or searching for cars.

Insert the blue station cards in the mainline filing box in the order in which the stations are arranged on your layout, and behind each station card insert as many white shippers' cards as you have delivery tracks at that station (Fig. 1). Set the mainline box handy to the mainline engineers, the yard boxes (if used) near the yard panels.

Correlate Cars and Cards.

Note all the cars in the terminal yard; remove their corresponding car cards from the general pack and insert them in the terminal yard box. Do the same for any other yards. Cards corresponding to cars which may be located on an outlying house track, private spur, etc., are inserted behind the white shippers' card bearing the name of such track or spur. Thus, all car cards are distributed to compartments corresponding to the actual location of every car on the railroad, and instantly and forever more, you have a complete, graphic picture of the location of every car, for it is clear that if there are 15 cards in the Chapelle Yard box, then there must be 15 cars of corresponding description in Chappelle Yard; and if the Villa Rica compartment is empty, then no cars are at Villa Rica.

One more compartment may be rigged up and labeled "Bad Order," "Rip Track," or "Shops"

for cars which must be removed from the layout for repairs. You may, if you wish, keep a complete record of repairs on the cards, dates the car was oiled, and so on—(Fig. 2).

The system is now ready to use. On operating night, when things are being organized for running, the yardmaster, dispatcher, trainmaster, or whoever may be in nominal charge, makes a quick survey of the boxes and finds the cars are distributed like this:

Chapelle (terminal yards) _____28
Dickson _____ 0
Villa Rica _____ 0
Louise Manor, interchange track _____ 3
Little River _____ 0
Ginia, Blum Lumber Co. _____ 1
    Gulf Coal Co. _____ 1
Portwood _____ 0
Donaldson, Donaldson Canning Co. _____ 1
    Hamm & Berger's _____ 1
    Icing Platform _____ 1
    Quick Sand & Gravel Co. _____ 1
Colbert (division yards) _____12

Of the total, nine cars are on various tracks at outlying stations. We agree that cars so located are presumed to be loaded and sealed, or that they have been unloaded, but in either case, waiting for the next local train to pick up and haul to some destination. The trainmaster decides that four will be shipped north to Colbert Yards and five south to Chapelle by the first locals traveling in these directions.

Selecting any four car cards at random for the *northerly* movement, he slips a *blue* "signal" over the top edge of each, pointing to the sign letters of the station to which the car will be shipped; in this case, CO. He slips *red* signals over the tops of the five *southbound* cars in similar manner (pointing to CH), and returns the cards to their slots. The blue and red signals stick up above the cards like sore thumbs so

Raymond Colliery—Aboo Peak in background.

Build a
200-TON RAILROAD CRANE

Every model railroad needs one. Drawings, plans and instructions by **Richard C. Mast**

IN THE NEXT ISSUE

that the engineer of any train will see at a glance just where and what cars he is to pick up on his run.

Making Up a Train.

To make up a northbound local to run from Chapelle to Colbert, the yardmaster selects any number of cards from the Chapelle Yard box —let us say eight or ten—and slips blue signals over the tops of each, pointing to the sign letters of the station he wishes to ship the car. He then clips a *pink* shippers' card to the car card which indicates the specific track on which he wants the car spotted. Thus, if a box car is to be consigned to Carter's Little River Mills at Little River, the signal points to LR and the small pink card reads Carter's Mills (Fig. 3). The thing takes longer to describe than it does to do. Actually, all the cards are tabbed in less than a half minute.

The trainmaster now turns over to the yardmaster the cards he has selected from the yard

box. This is the train consist. The yardmaster sorts the cards in the order the cars are to be marshaled into the train and hands them to the switch foreman. The stack of cards is now the switch list. When the makeup is completed and checked, the cards are handed to the engineer (or conductor) of the train stacked to match the sequence of way stations. They are now the sheaf of waybills. While we indicate several brass hats handling the cards, in order to identify the supposed procedure, it is no secret that one jack-of-all-trades handles the whole shebang.

It is only necessary for the engineer to glance at the top card to note the first delivery, and at the blue signals in the mainline box to locate the first pickup. Without more ado, he is ready to release his air, take the crossover to the high iron and work the division. And nary a pencil is used nor a form filled in.

Working the Division.

Rolling along the main stem, the hogger sees from his consist that a box car is to be set out on the house track at Villa Rica, and so when the local pulls into town he sets out the car on the house track, takes the car card from his consist stack, removes the signal and the tab, and inserts the card in the Villa Rica compartment behind the white card labeled "House

Union Pacific Color Chart

Steam Locomotives

Entire locomotive, black.
Lettering and figures, aluminum leaf.

Steam Locomotive Tenders

Entire tender, black.
Lettering and figures, aluminum leaf.

Diesel-Electric Road Locomotives

Sides and ends, Armour yellow.
Trucks, skirts and roof, harbormist gray.
Striping, bright red.
Lettering and figures, bright red edged with black, except City of Los Angeles and City of San Francisco Diesel-electric locomotives' ornamental side panels which have white lettering with black edging and bright red background.

Diesel-Electric Switching Locomotives

Entire locomotive, black.
Lettering and figures, Armour yellow and bright red.

Electric Locomotives

None.

Passenger Equipment

Sides, ends, trucks, platforms, hand holds and steps, dark olive green.
Roof, underframe and other underneath equipment, black.
Lettering and figures, golden yellow.

Streamlined Passenger Equipment

Sides and ends, Armour yellow.
Trucks, skirts and roof, harbormist gray.
Striping, 5-inch stripe at side sills and 2½-inch stripe at eaves, bright red.
Lettering and figures, bright red edged with black.

Freight Equipment¡

All types including caboose, except as listed below: Body, roof, underframe and trucks, freight-car red; lettering and figures, white except "Road of the Streamliners" and "Serves All The West," Armour yellow.

High - Speed Express Service Cars: body and roof, harbormist gray; underframe and trucks, freight-car red; striping, bright red; lettering and figures, Armour yellow.

Tank cars: tank, underframe and trucks, black; lettering and figures, white.

Open Top Cars. body, underframe and trucks, freight-car red; lettering and figures, white.

House Cars, Work Equipment: sides and roof, gray; ends, underframe and trucks, freight-car red; lettering and figures (sides), black; lettering and figures (ends), white.

Track." Then he pulls out for the next town.

As he wheels along, he sees three blue signals sticking up behind the "Interchange Track" card at Louise Manor and so maneuvers his train to pick up the cars, removing the three cards from the "Interchange" slot and, noting from the position of the signals that their destination is Colbert Yards, adds them to the bottom of his consist stack.

At Ginia, the cards indicate that he is to pick up an empty hopper car from the Gulf Coal Co. trestle and set out a loaded one, and this he proceeds to do, adding the car card of the empty to the consist stack and depositing the card for the loaded one in the Gulf Coal Co. compartment.

As he goes along from town to town, he picks up or sets out cars, and for the cars he sets out he leaves a card in the correct compartment in the mainline box. For those he picks up, he removes the cards from the mainline box and adds it to his consist stack. Simple, isn't it?

And, of course, in addition to all this swell switching and the put-and-take game with the cards, the hogger keeps tab on the clock and ducks into a siding when trains of superior right, class or direction are due, or he runs from station to station only on running orders from the dispatcher (whatever your method may be) until at long last, after being out on the division for two or three scale hours, he arrives at the end of his run with an entirely different group of cars and cards. And during every moment of the run, anyone may have known the exact location of each car on the layout.

In the meantime, the same system of train makeup and operation has been carried out for following trains or those running in the opposite direction. It is assumed that cars collected by the peddler freights will either be switched to unloading tracks at the terminal or made up into new consists to be carried through following divisions by dispatch freights, or grouped and switched to an interchange track for handling by a foreign line. These destinations can be indicated with the pink tabs.

When trains arrive at their destination, the engineer (or conductor) turns in his stack of cards to the yardmaster, who checks them with the cars in the train, then inserts them in his yard box and breaks up the train. The cars and the cards are immediately available for more trains without a moment's loss of time or any figuring or pencil work.

Thus as the schedule progresses and trains are dispatched up and down the line, car cards are removed from one compartment, carried along with the train and deposited in other compartments, and trainmasters (or their substitutes) will have a graphic picture of conditions at every moment so that they or anyone may select cars for as many trains as the schedule calls for. And as I said in the beginning, each train will have a new consist and new switching maneuvers without the slightest confusion.

In the end, the instant the last train arrives and the engine is wheeled to the bunkers, the record of car distribution is complete, graphic, and ready for the next schedule.

Do I eat any hats?   (The End.)

Train routings on layout can be traced by using this schematic drawing.

Passage

SUMMIT — Profile houses and hills — Profile hills

Mountains

Caboose

FILLMORE

Passenger station

Freight yards 36 cars

Falls

Timber trestle

DICKSON

Deck girder

Winnecasooki River

Peck truss

Salt mine

Gravel pit

Yard panel

Engineer controls

Roundhouse

Ash pit

Work

In

Out

Coal

Cliffs

PORTWOOD

Wye

Stoop under

Sand

Through

ABOO PEAK

Coal mine

Raymond colliery

Commissary

Lift

Parade track

Yard office

North Bound

Lay-over and switching yards

Locomotives change tracks

VIRGINIA

Profile hills

Through tunnel

Pratt truss

Lucas change tracks

South Bound

COLBERT

CHAPELLE DIVISION

Yard panel

Coal

Granite cliffs

Timber tunnel

Milk depot

Diners

FILLMORE DIVISION

Lumber

Profile hills

Passage

Distant landscape

Landscape

Road

RIVER JUNCTION

Stock pen

Lift

Factory

Deck girder

VILLA RICA

RJ tower

TADPOLE CREEK

Through girder

RUTH'VELT

Ties

Interurban ends

DONALDSON

Corner

Stock

Road

Bascule bridge (unfinished)

Bulk plant

Farm fields

Stone arch bridge

MARTHAVILLE

Gold spike

LM tower

End of double track

Road

Steam

Wye

Stone arch bridge

Quarry

Industrial siding

MT. ELEANOR BRANCH
(trolley) to be built

Electric sub-division

Branch line car

Old Man

Freight

MT. ELEANOR

Coal

Road

oil

Piles

Carter's Little River Mills

Dodd Dow Power Co.

Dodd Dam

LOUISE MANOR

Branch panel

LM panel

Engineer

panels

Landscape

Profile ship

DELTA LINES
Feet
0 1 2 3 4

CHAPELLE

Yard panel

Passenger shed

Underground tracks

Freight yard

Wharf sheds

F.C.E

Power house

Hinged