

Cars ready to move:

- (1) *State number of loads and empties.*
- (2) *Cars ready to move over 24 hours. State number of loads and empties.*

The weather report, amount of water in tank, and coal report will be sent in at the same time.

This daily telegraphic car report will be formed into a large blank. The various headings and subheadings across the top will be numbered or lettered, so as to form a code that the operators can use in making this report.

An alphabetic code necessitates the use of only two letters, and hence is quicker. The list of stations is printed down the side of the blank.

On receipt of this information from all points on his division, the chief dispatcher is able to distribute the required empties and arrange to pick up all loaded cars.

A summary of the consolidated report showing the car situation on each division is promptly telegraphed to the car-service agent, who distributes cars among the divisions.

235. Detaining cars.—The history of the Civil War and the war in South Africa both emphasize strongly the necessity for the most stringent orders with reference to the **prompt unloading of cars.** The R. S. O. is authorized to call on the C. O. of the station for the necessary details to unload the cars immediately upon their arrival. If for any reason he can not get such details, or can not unload the cars inside of 24 hours, he will report the facts to the military superintendent by telegraph.

236. Troop movements.—When an order for the movement of troops from any station is received at the station, the R. S. O. will immediately find out the following points with reference to the proposed movement from his station:

- (1) The number of men and officers.
- (2) The number of animals.
- (3) The number of wagons, guns, etc.
- (4) The amount of supplies that will be carried with the troops.
- (5) The destination of such troops.
- (6) The time of departure.

He will immediately forward this information by telegraph to the military superintendent with such other information with reference to the movement as he may think necessary.

237. Inspection of rolling stock.—The inspection department is directly under the master mechanic; and is divided into two parts—inspection of cars and inspection of locomotives. Certain points along the line are indicated as **inspection points for cars**, and all cars entering such stations are inspected to see that all parts are in proper condition. The wheels are tested by a blow with a hammer to discover defects. At these inspection points cars are marked "O. K." if in good shape, and "B. O." if in bad order, and the initials of the inspector are written below to show who made the inspection. "Bad-order" cars are forwarded to the nearest car-repair station, if practicable; if not, they are set out (their loads may be transferred) and car repairers sent to repair them at that point.

These car inspectors are usually also oilers, and they see that the boxes are properly filled with waste and properly oiled.

In **oiling cars**, the oiler should be careful to get the waste packed well under the journal and in contact with the bottom of the journal. They must not get the boxes too full, as this is a fruitful source of **hot boxes.**

238. Locomotives are inspected on their arrival at the roundhouse by regular locomotive inspectors. They go over the locomotive thoroughly and submit a separate report on each. This report is compared with the report made by the engineman on the completion of his run, and each is held responsible for a defect reported by the other that is not shown in his report.

This method of inspection of locomotives is especially necessary when the power is pooled. Power is known as "pooled" when no certain locomotive is assigned to one engineman, but the locomotives are run out of the roundhouse in the order of their coming in. An engineman needs from eight to ten hours' rest after a run, whereas a locomotive, if in good order, can be made ready for another run inside of a couple of hours. In addition to this saving of power, it has been found that the locomotives are in better shape on account of the report required by the engineman and the check report made by the locomotive inspector. This pooling of power brings bad results except when used in connection with a double inspection and separate reports.

Any defect reported on a locomotive by either engineman or inspector is promptly repaired in the roundhouse if possible; if not, the locomotive is sent to the shops.

Power is known as assigned when each locomotive is assigned to a single engineman and used by him alone. The advantage of this method is that the engineman takes special pride in his own locomotive and may give it greater care than he will if the locomotive will be out under several other enginemen before he again has occasion to run it. The disadvantage is that the locomotive must lie up unnecessarily long waiting for the crew to rest.

A combination of the two methods combines the advantages of both and practically eliminates the disadvantages. This is attained by assigning two locomotives to three crews; under this method, as under the pooling method, cross-inspection by enginemen and locomotive inspectors is imperative for good results.

239. Operators and dispatchers are authorized to use the following calls and abbreviations:

- 1..... Wait a minute.
- 3..... Give me correct time.
- 4..... Where shall I repeat from?
- 5..... Close your key; you are breaking.
- 7..... I have business; are you ready?
- 8..... Busy on other wire.
- 9..... To clear the line for train orders, and for operators to ask for train orders; on division, wire will have preference over all signals excepting "21."
- 12..... Do you acknowledge receipt of this order, and do you fully understand it?
- 13..... I hereby acknowledge the receipt of order, and state that I fully understand and will execute the same.
- 14..... What is the weather?
- 15..... Have you any orders?
- 16..... Dispatcher's freight report.
- 17..... Daily weather report.
- 18..... What is the matter?
- 19..... Train order, as provided in par. 334; or call for same.
- 21..... Extreme emergency; on division wire this must have preference over all other business; on through wire will have preference over signals "25" and "34."
- 23..... The following is for you and others.
- 24..... Repeat this back.
- 25..... Time reports of passenger and troop trains to general superintendent (used on through wire); preference of circuit over ordinary and "34" business.
- 28..... Do you get my writing?
- 29..... This is private and must be delivered in sealed envelopes.
- 31..... Train order as provided in par. 334; or call for same.
- 34..... This message is of great importance.
- 39..... This must have preference over all other business on all wires, and will be used *only* by the G. C. and C. of S. of army or of L. of C., the D. R., D. D. R., and A. D. R.
- 41..... This will have preference over all calls on through wires except 39, and will be used *only* by general manager, general superintendent, and chief engineer.
- 92..... This message should be copied in ink.

Operators must not make use of any signals for business other than that to which such signals are assigned. In other words, signals must not be given falsely; as, for instance, making use of "39" for "34" business in order to obtain the wire.

C. & E... Conductor and engineman.

X..... I have displayed my train order signal, and train will be held until orders is made complete.

H. R.... I wish to hold the circuit.

S. D..... Stop displayed.

Usual abbreviations for months and stations.

Initials for signatures of division officials, office calls, and other signals authorized by chief dispatcher.

240. **Signals.**—On every road a system of signals is used to convey certain fixed orders or information. The following, while not universal, are in very common use. Flags of the prescribed color are used by day and lanterns or lamps at night.

241. Color signals.

Color.	Indication.
(a) Red.....	Stop.
(b) Green.....	Proceed, and for other uses prescribed by the rules.
(c) Green and red.....	Proceed with caution, and for other uses prescribed by the rules.
(d) Green and white.....	Flag stop (see par. 263), and for other uses prescribed by the rules.
(e) Blue.....	Men working under or about cars on that track.

If the light system of a road taken over for military use differs from above, these rules must be changed to correspond to adopted system.

A fusee on or near the track burning red must not be passed until burned out.

242. Hand, flag, and lamp signals.

Manner of using.	Indication.
(a) Swung across the track.....	Stop.
(b) Raised and lowered vertically.....	Proceed.
(c) Swung vertically in a small circle across the track when the train is standing.	Back.
(d) Swung vertically in a circle at arm's length across the track when the train is running.	Train has parted.
(e) Swung horizontally back and forth above the head when the train is standing.	Apply air brakes.
(f) Held at arm's length above the head when the train is standing.	Release air brakes.

Any object waved violently by anyone on or near the track is a signal to stop, unless the engineer has reason to believe it to be a ruse to induce him to stop the train, when he will proceed with caution.

Audible signals.

243. Locomotive whistle signals ("○" indicates short blast; "—" indicates long blast).

Sound.	Indication.
(a) ○.....	Stop. Apply brakes.
(b) —.....	Release brakes.
(c) —○ ○ ○.....	Flagman go back and protect rear of train.
(d) ———○ ○ ○.....	Flagman return from west or south.
(e) ———○ ○ ○.....	Flagman return from east or north.
(f) ———.....	When running, train parted; to be repeated until answered by the signal prescribed by par. 242 (d). Answer to signal prescribed in par. 242 (d).
(g) ○ ○.....	Answer to any signal not otherwise provided for.
(h) ○ ○ ○.....	When train is standing, back. Answer to signal prescribed in pars. 242 (c) and 247 (c).
(j) ○ ○ ○ ○.....	Call for signals.
(k) —○ ○.....	To call the attention of trains of the same or inferior class to signals displayed for a following section.
(l) ———○ ○.....	Approaching public crossings at grade.
(m) ———.....	Approaching stations, junctions, and railroad crossings at grade.

244. Should a train fail to answer signal 243 (k), the train displaying the signals must stop at once and not proceed until they are acknowledged. On double track, signal (k) will only be used when passing trains.

245. A succession of short sounds of the whistle is an alarm for persons or cattle on the track, and calls the attention of trainmen to danger ahead.

246. The explosion of one torpedo is a signal to stop; the explosion of two not more than 200 ft. apart is a signal to reduce speed and look out for a stop signal.

Torpedoes must not be placed near stations or road crossings where persons are liable to be injured by them.

247. Air-whistle or bell-cord signals.

Sound.	Indication.
(a) Two.....	When train is standing, start.
(b) Two.....	When train is running, stop at once.
(c) Three.....	When train is standing, back the train.
(d) Three.....	When train is running, stop at next station. To be answered as per par. 243 (g).
(e) Four.....	When train is standing, apply or release air brakes.
(f) Four.....	When train is running, reduce speed.
(g) Five.....	When train is standing, call in flagman.
(h) Five.....	When train is running, increase speed.
(j) Six.....	When train is running, increase steam heat.

248. The headlight will be displayed to the front of every train by night, but must be concealed when a train turns out to meet another and has stopped clear of main track, or is standing to meet trains at end of double track or at junction.

249. **Yard locomotives** will display the headlight to the front and rear by night. When not provided with a headlight at the rear, two whitelights must be displayed with a red light between them. Yard locomotives will not display markers.

250. **The following signals** will be displayed, one on each side of the rear of every train, as markers, to indicate the rear of the train: By day, a green flag; by night, a green light to the front and side and a red light to the rear, except when the train turns out to be passed by another, and is clear of main track, when a green light must be displayed to the side and rear.

251. **By night**, passenger and freight trains, while upon main track, will display a red light to the rear in addition to the markers, and freight trains, when practicable, will display a white light to the front from the top of caboose.

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

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

254. **When two or more locomotives** are coupled to the head of a train, the leading one only shall display the signals prescribed by pars. 252 and 253.

255. **When cars are pushed** by a locomotive (except when shifting or making up trains in yards), a white light must be displayed on the front of the leading car by night.

256. Each car on a passenger train must be connected with the locomotive by a communicating signal appliance.

257. A **blue flag** by day and a **blue light** by night displayed at one or both ends of a locomotive, car, or train, indicates that workmen are under or about it. When thus protected it must not be coupled to or moved. Workmen will display the blue signals and the same workmen are alone authorized to remove them. Other cars must not be placed on the same track so as to intercept the view of the blue signals, without first notifying the workmen.

258. A **green and red flag** by day, and in addition a **green and red light** by night, placed beside the track on the engineman's side, indicates that the track 3,000 ft. distant is in condition for speed of but **6 miles per hour** and the speed of a train will be controlled accordingly.

259. A **green flag** by day, and in addition a **green light** by night, placed on the engineman's side at a point beyond the slow track, indicates that **full speed** may be resumed.

260. **Main-track switch targets** will show **green** when the switch is set for the main track, and **red** when set for sidings, crossings, or junction tracks. All other switch targets will show white or green.

261. A **slow board** placed alongside the track, reading "Reduce speed to ——— miles per hour," will indicate the rate of speed at which the track may be used at a point 3,000 ft. distant from such slow board. The rate of speed indicated on the slow board must not be exceeded. Beyond the point to be protected will be placed a sign reading "Resume full speed." A **green and red light** and a **green light**, respectively, will be suspended from these boards at night.

262. A signal **imperfectly displayed**, or the absence of a signal at a place where a signal is usually shown, must be regarded as a stop signal and the fact reported to the assistant superintendent.

263. The **combined green and white** signal is to be used to stop a train only at the flag stations indicated on the schedule of that train. When it is necessary to stop a train at a point that is not a flag station for that train, a red signal must be used.

TIME.

264. Trains will be operated on **standard time**, when standard time is available. Otherwise, a certain clock will be used, and its time used as a standard.

The clocks and watches used in the operation of the road must conform to the adopted time.

The time will be sent over the road at least once daily.

265. All watches of employees will be examined and certified to by some officer or watch inspector, who will certify to the condition and kind of watch carried by each employee.

OPERATIONS OF TRAINS

266. Trains are operated so as to keep them a certain distance apart for safety. This distance is measured either by a **time interval** or a **space interval**. The various systems receive their names from the kind of interval used and the method of maintaining them. The following are the best-known systems:

Time interval { Telegraphic orders.
Telephonic orders.

Space interval, i. e., block system { Absolute.
Permissive.

Manual block system.

Simple manual block system.

Controlled manual block system.

Lock and block form.

Simple communication between stations.

Communication between stations and partial electrical track protection.

Communication between stations and complete electrical track protection.

Staff form.

Single staff.

Half and half.

Automatic block system.

267. **Time interval.**—Operating trains upon this method involves train dispatching and is usually known as the **train order method**. These orders govern the train movement from one station to another where orders for further movement are received. The meeting and passing points are given for other trains. The train can be stopped at any intermediate point by directing the operator at that station to display his train order signal. Trains are held a certain distance apart forming the time interval. The system is inadequate and unsafe under fast and heavy traffic conditions. The orders are issued by telegraph or telephone. The former is the older and was universal until a few years ago, but the telephone has to-day largely displaced the telegraph owing to the greater facility and speed and safety in the transmission of orders. This system has become efficient through the selective method of signaling to one or more operators whereby there is no time lost in ringing up the one or more persons desired. The same forms of train orders are used with both the telephone and telegraph.

To obviate the issuance of train orders for trains which run regularly every day, a time table is made up covering the regular movements. A train included therein will operate habitually on this schedule and hence require train orders only to assist it when it or others can not meet the schedule conditions or to provide for movements of other trains not included in the time table.

268. **Space interval.**—As the name implies, the interval between trains in this method of operation is measured by distance instead of time. The road is divided into sections or blocks, into which only one train is allowed full rights at a time. Others may be admitted going in the same direction, but they are limited by the presence of the other trains in front of them.

The method is applicable to both single and double track lines and for trains going in the same direction there are two methods, the **absolute** and the **permis-**

sive systems. In the former only one train is allowed in a block at one time; in the latter, one or more trains, with certain time intervals, may be allowed in the same block under a **caution card** or **clearance card** warning them of the other train ahead in the block. The length of the blocks varies from one mile to five or six miles.

269. Simple manual block system.—In this system the operator at station C ascertains if the block CD is clear, and if so, he admits the train into CD, notifying operator at D that he is doing so. D ascertains if DE is clear, and if so, lowers his signal and allows the train to pass. If not clear, he holds his signal against the train, which can not proceed until the block is clear. The method is controlled by telegraph or telephone communication. There is no lock system. The system is only a step in the right direction.

270. Controlled manual block system—Lock and block.—In this system there is electrical communication between the block signals at stations B and C and at C and D, as well as between the operators. By agreement between C and D, operator C opens his block and allows the train to pass C; the block at C then automatically locks at danger and remains there until the train passes the block at D. Permissive blocking will allow another train to follow, with a caution card, after a certain time interval.

271. Staff system.—In its simplest form this consists in the operator at C giving a staff to the conductor of one train, who carries it to the next station, D, turns it over to the operator there, who delivers it to the next train in the opposite direction, as authority to proceed back to C. The objections and delay in this are obvious. The electrical staff system consists of instruments at each station, each electrically connected to the next station on each side. When a train at C desires to go to D, the operator at C, by agreement with the one at D and mutual action, is able to remove a staff from his instrument. He gives this to the conductor, who proceeds to D. Meantime the staff instruments at both C and D are locked, and no staff can be taken out until the staff is delivered at D and placed in that instrument. Either one of the operators can then again release the other's instrument for another train movement.

A jointed staff of two parts for both conductor and engineman is a guard against the dangers arising from a train breaking in two. A many-jointed staff is used in the permissive blocking, a part being given to each train in the block. The blocks at C and D remain locked until the complete rejointed staff has been returned to the instrument at D. An adaptation permits the staff to be received or delivered while the train is in motion as trains catch mail sacks.

272. Automatic block system.—This system is especially applicable to a double-track line but can be applied to single track also. The towers of the signals carrying the arms are at convenient distances apart. As soon as the rails are cross connected beyond the tower the arm is moved to the danger position and stays there till the last wheels leave that block. Usually they also affect the second signal in rear, moving its arm to the caution position. This system is necessarily a permissive one as a signal may be out of order and a train can proceed with caution after waiting a prescribed time for the signal to clear the line. On a single-track line this system must protect the train from the front as well as from the rear and must also give that protection at the next siding so that an opposing train can take the siding and get out of the way. This system is not usual on single-track lines, but by using automatic blocks between stations with the manual system at stations the capacity of a single-track line has been estimated to have increased 30%.

273. Movements of trains.—Freight and passenger trains are usually divided into classes, and each class has certain rights over inferior classes; one direction is also made superior to the other.

Trains of any class going in the superior direction are superior to trains of the same class going in the inferior direction.

First-class trains are usually regular passenger trains; second-class trains are usually quick-dispatch, or time, freights, third-class trains are usually dead freights, empties, or local freights. Extra trains will be given such rights, by train orders, as the chief dispatcher or his superiors may direct. Some of the more general regulations governing train movements are given in the following paragraphs.

Complete sets can readily be prepared from those now in use by any of two or three of the leading railways. They all follow very closely the American Railway Associations Standard Code previously referred to.

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

275. A train leaving its initial station on each division, when a train of the same class in the same direction is overdue, will proceed on its own schedule and the overdue train will follow at least 10 minutes later.

276. An inferior train must keep out of the way of a superior train by the amount of time indicated in the time-table. A train failing to clear the main track in the time required in the time-table must protect itself by a flagman, who will go back a sufficient distance to insure protection. When recalled, he will return to his train, first complying with par. 322 when the conditions require it.

277. When a train stops or is delayed on the main line, similar precaution will be taken; and if danger exists from the front, a flagman will be sent out in that direction.

278. At meeting points of trains of the same class, the inferior train must clear the main track 5 minutes before the leaving time of the superior train. If necessary to back into siding, it will protect itself as hereinbefore provided.

279. When extra trains meet, the train of the superior direction will hold the main line unless otherwise directed. The train holding the main line will adjust the switch for the opposing train. At meeting points between trains of different classes, the inferior train must take the siding and clear the main line at least 5 minutes ahead of the other's time.

280. An inferior train must keep at least 10 minutes off the time of a superior train in the same direction.

281. Trains must stop at schedule meeting or passing stations if the train to be met or passed is of the same class, unless the switches are right and the track clear.

282. Trains should stop clear of the switch used by the train to be met, or passed, in going on the siding.

283. When the expected train of the same class is not found at the schedule meeting or passing station, the superior train must approach all sidings prepared to stop until the expected train is met or passed.

284. When trains meet by special order or time-table regulation, the conductors and enginemen will inform each other what train they are by word of mouth.

285. Unless some form of block signal is used, trains in the same direction must keep at least 10 minutes apart, except in closing up at stations.

286. A train must not arrive at nor leave a station in advance of its scheduled time. At schedule passing stations between trains of the same class, the train to be passed, unless otherwise directed by special order, will remain at that point until the expected train has passed.

287. A train which overtakes a superior train, or train of the same class, so disabled that it can not proceed, will pass it if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next open telegraph office, and there report to the assistant superintendent. The disabled train will assume the schedule and take the train orders of the last train with which it has exchanged, and will, when able, proceed to and report from the next open telegraph office.

288. A train must not display signals for a following section nor an extra train be run without orders from the chief dispatcher.

289. Trains must approach the end of the double track, junctions, railroad crossings at grade, and drawbridges prepared to stop, unless the switches and signals are right and the track is clear.

290. All trains must stop not less than 200 ft. nor more than 800 ft. before crossing any railroad at grade, except where interlocking signals are in use.

291. Both engineman and fireman must see signals at block stations, railroad crossings, drawbridges, and junctions, and communicate with each other the position of the signals.

292. When a train is to back out of a siding, the flagman must go a sufficient distance to the rear to insure full protection.

293. Before a train crosses over to or obstructs another main track, unless otherwise provided, it must be protected on that track.

294. When a flagman goes back to protect the rear of a train, the conductor can assign any one of the trainmen to perform his duties until he returns.

295. In case a passenger train is due within 10 minutes, or an approaching train is within sight or hearing, the flagman must remain out until it arrives.

296. If a train should part while in motion, trainmen must, if possible, prevent damage to the detached portions. The signals prescribed by pars. 242(d) and 243(f) must be given, and the front portion of the train kept in motion until the detached portion is stopped.

297. The front portion will then go back to recover the detached portion, running with caution and following a flagman. The detached portion must not be moved or passed until the front portion comes back.

298. Messages or orders respecting the movement of trains or the condition of track or bridges must be in writing and in train-order form.

299. Switches must be left set and locked for the main track after having been used.

300. Conductors are responsible for the position of the switches used by them and their trainmen, except where switch tenders are stationed.

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

302. When a train backs in on a siding to meet or be passed by another train, the engineman, when his locomotive is in the clear, must also see that the switch is properly set for the main track.

303. Enginemen must know that switches are properly set before they pull into or out of sidings or other tracks.

304. Trainmen or other employees must not unlock main-track switches, nor stand within 20 ft. of such switch on the approach of or during the passing of any train, and when practicable, on single track, he will stand on the opposite side of the track from the switch lever.

305. No attempt should be made to close the switch until the last wheels are off the switch rails. The person who locks the switch must grasp the chain and pull the lock to see that it is securely fastened, and after having done so, must look at the switch rails and know that they are in their proper position.

306. Both switches to a crossover between main tracks must be locked for the main tracks during the passing of any train on the opposite track, and must not be unlocked or opened until the train is ready to use the crossover.

307. If any switch upon the main track is found to be defective, or to have a defective lock, the switch must be secured and reported at once by telegraph to the assistant superintendent by the conductor, engineman, or other person who may have discovered it.

308. Both conductor and engineman are responsible for the safety of their trains, and under conditions not provided for by the rules, must take every precaution for their protection.

309. In all cases of doubt or uncertainty, the safe course must be taken.

310. Where yard limits are defined by limit boards, no locomotive or train is permitted to occupy main line in the time of regular trains without protection. At such points extra trains must approach at reduced speed, prepared to stop within their vision.

311. It must be understood that a train is officially due to arrive at a station upon its schedule departing time from the preceding station.

312. When signals displayed for a section are taken down at any point before that section arrives, the conductor will, if there be no other provision, notify the operator or agent in writing, who will immediately display the train-order signal and keep it in danger position for the benefit of opposing trains until the arrival of the train so flagged, and he must personally see that opposing trains are fully notified.

313. If the signals displayed for a section are taken down where there is no operator or agent, a flagman must be left for the purpose of notifying all opposing trains of the same or inferior class leaving such points that the section for which the signals were displayed has not arrived.

314. Conductors and enginemen taking down signals for a following section, as above, must not rely solely on notice being given at said station, but must themselves notify other trains met until they arrive and register at the next registering station.

315. Work extras will be assigned working limits by train order daily. In case orders should be given to a point outside of the working limits for water, fuel, or any other cause, the "working order" is thereby canceled, unless the subsequent order expressly states the contrary.

316. Conductors of work extras must know that all trains due have arrived before they start out with the work train. They must also leave a memorandum every evening with the nearest telegraph operator, stating where the train will be at work during the following day, and this memorandum must be forwarded by telegraph to the chief dispatcher.

317. Work extras will be assigned working limits, and when operating upon double track must move, within these limits, with the current of traffic, unless train orders otherwise direct.

318. No freight train shall pass an open telegraph office not controlled by telegraph block system, except as provided by division time-tables, whether or not train-order signal be displayed, until the conductor and engineman have received orders from the train dispatcher, or a release or clearance, as the case may require, from the operator. Conductors and enginemen of passenger trains will observe the same rule at such telegraph offices as are regular stops for their trains. Extra freight trains will observe the same rule as regular freight trains, but extra passenger trains are not required to make stops solely for this purpose. They will be governed in this respect the same as regular passenger trains. This does not relieve operators from promptly displaying red signals whenever they have orders, or making other necessary efforts to stop trains.

319. A "clearance" (see par. 385) will be properly filled out and given, in duplicate, to the conductor and engineman of the train in all cases where the rules governing the movement of trains require conductors to ask for orders, provided the train-order signal is not displayed and no orders have been received for their train.

A clearance should be given in cases where trainmen are required to ask for orders and the train-order signal is not displayed, except as may be provided for by division time-tables.

320. If the train-order signal be displayed, but for another train, a release must be given instead of a clearance.

321. A "release" (see par. 383) will be properly filled out and given, in duplicate, to the conductor and engineman of a train when held by the train-order signal, in case no order has been received for their train, except as provided for by division time-tables.

322. In case of stoppage between stations, the flagman must immediately go back with not less than two torpedoes, and a red flag by day or a red and a white lantern and two red fuses by night, and at night place a lighted red fusee in the center of the track 500 ft. behind the rear of the train, proceeding by day or night to a point not less than $\frac{3}{4}$ mile distant from rear of train until he reaches a point where the danger signal can be seen not less than $\frac{1}{4}$ mile by the engineman of any approaching train. The flagman will at once place one torpedo on the rail on the engineman's side, and will remain at such point until the train has arrived, or until he is recalled. The engineman of approaching train, on seeing the flagman's signal, will immediately call for brakes, as evidence that the signal has been seen. When the flagman has been recalled, and no approaching train has arrived, he will place a second torpedo on the rail 200 ft. nearer his train than the first and return with all possible dispatch to his train. On exploding one torpedo, only, the approaching train will be brought to a full stop, and thereafter proceed with extreme caution, expecting to find some obstruction on the track. When a second torpedo is exploded, the engineman will know that the flagman has been recalled, and will proceed cautiously, keeping a sharp lookout for the train ahead. Immediately on the sound of the whistle recalling flagman, if there is not a clear view to the rear for $\frac{1}{4}$ mile from the rear of train, the train should be moved ahead at a speed of not less than 6 miles per hour until a point is reached where the track is straight for $\frac{1}{4}$ mile in the rear of train, always bearing in mind that the time of the flagman's return is the period of greatest risk. When the character of the road or weather makes it necessary, the flagman shall go a greater distance with the signals, so as to insure absolute safety. It must be distinctly understood that the conductor of the train, or the engineman of a locomotive running light, is held responsible for the safety of his train or locomotive. When any train has been stopped by a preceding train in the manner above mentioned, the conductor of the last train must use the same precautions with regard to any following trains as those heretofore described. When it is necessary to protect the front of a train, the same precaution shall be observed by the front brakeman or fireman. Conductors are held responsible for the proper protection of their trains under all circumstances.

323. A train must not be allowed to stand on a curve between stations, if practicable to avoid it.

324. In addition to the above protection, a red fusee will be considered an extra precaution, and will be used under circumstances requiring the same. Should a train, for any cause, be required to reduce its speed between stations, or at unusual points, a red fusee must be lighted and placed upon the track as an additional protection for the following trains, to insure a time limit between trains of not less than 5 minutes.

325. If a conductor or engineman discovers anything wrong with the track, bridges, or culverts which would be likely to cause an accident to a following train, he must leave a flagman, call the section men, and notify the train dispatcher by wire.

RULES FOR TRAIN MOVEMENT BY ORDERS.

326. If all trains run on a division were regular trains, and all such trains were always on time, trains could be run on the time-table without any assistance or intervention of the train dispatcher. This is manifestly impossible, and a system of telegraphic control is used on all roads to control the movement of trains. Any train movement not covered by the time-table or by some rule of the road must be ordered by the train dispatcher. Each train leaves the terminal with orders to go to a certain point, where further orders will be received. The train proceeds to that point, unless sooner stopped by signal at some intervening point for different orders. Upon reaching the designated station, or if stopped (by signal) at some intermediate point, it receives orders that cover its move over another short section of line.

Whenever a regular train is late and can not run on its schedule, other trains are helped along by train orders which change the meeting or passing points of the respective trains for that particular trip.

327. Trains meet each other when moving in opposite directions, and they pass each other when moving in the same direction.

328. For movements not provided for by time-table, train orders will be issued by authority, and over the signature, of the chief train dispatcher. They must be brief and clear, in the prescribed form when applicable, and without erasure, alteration, or interlineation.

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

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

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

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

333. Regular trains will be designated in train orders by their train numbers (written in words *and* figures), engine numbers, and conductors' names, as "*2d No. Ten 10 Eng. 504, Smith*;" extra trains, by engine numbers and conductors' names, as "*Extra 798, White*," with the direction as *North, South, East, or West*. Time in body of the orders must be written in words and duplicated in figures. Figures must not be surrounded by brackets, circles, or other characters, but appear plainly without accompanying marks.

334. To transmit a train order, the signal "31" or "19" must be given to each office addressed, the number of copies being stated, thus: "31 copy 5;" "19 copy 2." A "31" order is not completed until after signed by conductor and operator. A "19" order is completed on signature of operator.

335. A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all the order must be sent first to the superior train.

336. When a meeting point is to be made between two trains at a certain station, the order, when practicable, should be sent for said trains to stations at either side of the actual meeting point; also to the operator at the actual meeting point, if a telegraph office.

337. Operators receiving train orders must write them in manifold during transmission, and if they can not at one writing make the requisite number of copies, must trace others from one of the copies first made.

Operators required to make new or additional copies of an order will, in every instance, repeat these copies the same as the original order.

338. When a train order has been transmitted, operators must first set their signals, then give "X" response (see par. 239), and (unless otherwise directed) repeat it at once from the manifold copy in the succession in which the several offices have been addressed, and then write the time of repetition on the order.

339. Each operator receiving the order should observe whether the others repeat correctly.

340. Those to whom the "31" order is addressed, except enginemen, must read it aloud, then sign it, and the operator will send their signatures, preceded by the number of the order, to the train dispatcher. The response "O. K." and the time, with his initials, will then be given by the train dispatcher. Each operator receiving this response will then write on each copy "O. K.," the time, train dispatcher's initials, and his own last name in full, and then deliver a copy to each person addressed, except enginemen. The copy for each engineman must be delivered to him personally by the conductor, and the engineman must read it aloud to the conductor before proceeding.

341. When a "19" order is received at actual meeting point as per last clause of par. 336 the operator will set his signal, give "X" response, repeat the order, sign his name, and receive "O. K." to same, and after receiving the signature of the conductor will deliver two copies of the order to the conductor of the train first arriving. This rule applies to time and positive meet orders. On a single-track road a "19" order is used only to confer a right upon a train, and not to restrict the rights or the superiority of a train.

Some roads do not use the "19" order form. The safe use of this form requires a highly trained personnel and, in view of this fact, it is probable that form "31" would be the only form used on a military railway.

342. Conductors must show their orders to rear brakeman or flagman, and the engineman to the fireman, and (in case of a freight train) to the head brakeman, who are required to read them.

343. A train order must be acknowledged by the operator responding: "X; (number of train order) to (train number)," with the operator's initials and office signal. The operator must then write on the order his initials and the time.

344. "O. K." must not be given to a train order for delivery to an inferior train until the "X" response has been sent by the operator who receives the order for the superior train.

345. When the "X" response is given to a train order and before the "O. K." has been received, an order must be treated as a holding order for the train addressed, and must not be delivered until it has been repeated and the "O. K." has been given.

346. If the line fails before an office has sent the "X" response, the order at that office is of no effect and must be there treated as if it had not been sent.

347. The operator who receives and delivers a train order must preserve the lowest copy.

348. For train orders delivered by the train dispatcher, the requirements as to the record and delivery are the same as at other points.

Such orders shall be first written in manifold so as to leave an impression in the record book, from which transmission shall be made.

349. A train order to be delivered to a train at a point not a telegraph station, or at one at which the telegraph office is closed, must be addressed to:

"C & E. at, care of,," and forwarded and delivered by the conductor or other person in whose care it is addressed. In such cases the "O. K." will be given upon the signature of the person by whom the order is to be delivered, who must be supplied with copies for the conductor and engineman addressed, and a copy upon which he shall take their signatures. This copy he must deliver to the first operator accessible, who must preserve it and at once transmit the signatures of the conductor and engineman to the train dispatcher.

Orders so delivered must be acted on as if "O. K." had been given in the usual way.

For orders which are sent in the manner herein provided, to a train, the superiority of which is thereby restricted, "O. K." must not be given to an inferior train until the signature of the conductor and engineman of the superior train has been received by the train dispatcher.

350. When a train is named in a train order, all its sections are included unless particular sections are specified, and each section included must have copies addressed and delivered to it.

351. An operator must not give the "X" response to a train order for a train the locomotive of which has passed his train-order signal, until he has ascertained that the conductor and engineman have been notified that he has orders for them.

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

353. When a conductor or engineman relieves another before completion of a trip, they exchange orders, and before proceeding conductor must compare orders with the new engineman.

354. A train must not leave a terminal without a clearance, release, or train order.

355. A fixed signal must be used at each train-order office, which shall indicate "stop" when trains are to be stopped for train orders. When there are no orders, the signal must indicate "proceed," except when used to keep trains a required distance apart.

356. When an operator receives an order for a train, before acknowledging by the "X" response to the train dispatcher the receipt of same he will display his train-order signal at "stop" position; and until the orders have been delivered or annulled, the signal must not be restored to "proceed."

While "stop" is indicated, trains must not proceed without a release (par. 383).

357. Operators must have the proper appliances for hand signaling ready for immediate use if the fixed signal should fail to work properly.

358. If a signal is not displayed at a night office, even a train which has not been notified must stop and ascertain the cause, and report the facts to the train dispatcher from the next open telegraph office.

359. When a semaphore is used, the arm indicates "stop" when horizontal, and "proceed" when in an inclined position.

360. Operators will promptly record and report to the train dispatcher the time of departure of all trains and the direction of extra trains. They will record the time of arrival of trains and report it when so directed.

FORMS OF TRAIN ORDERS.

361. The following are the standard forms prescribed by the American Railway Association. They are applicable to military railway conditions and should be followed literally.

362. Form A.—Fixing meeting points for opposing trains:

(1) will meet at

(2) will meet at, at (and so on).

Examples.

(1) *No. Three 3 Eng. 96, Jones, will meet Second No. Four 4 Eng. 106, Lane, at Siam.*

(1) *No. Five 5 Eng. 176, White, will meet Extra 95 West, Phillips, at Hongkong.*

(1) *Extra 652 North, Williams, will meet Extra 231 South, Yates, at Yokohama.*

(2) *No. One 1 Eng. 80, King, will meet No. Two 2 Eng. 100, Vilas, at Bombay Second No. Four 4 Eng. 65, Peat, at Siam, and Extra 95 West, Phillips, at Hongkong.*

Trains receiving these orders will run with respect to each other to the designated points, and there meet, in the manner provided by the rules.

363. Form B.—Directing a train to pass or run ahead of another train:

- (1) will pass at
- (2) will run ahead of to
- (3) will pass at and run ahead of to

Examples.

- (1) *No. One 1 Eng. 67, Palmer, will pass No. Three 3 Eng. 105, Seton, at Khartoum.*
- (2) *Extra 594 East, Potter, will run ahead of No. Six 6 Eng. 1015, King, Bengal to Madras.*
- (3) *No. One 1 Eng. 67, Palmer, will pass No. Three 3 Eng. 105, Seton, at Khartoum and run ahead of No. Seven 7 Eng. 415, Asker, Madras to Bengal.*

When under (1) a train is to pass another, both trains will run according to rule to the designated point and there arrange for the rear train to pass promptly.

Under (2) the second-named train must not exceed the speed of the first-named train between the points designated.

364. Form C.—Giving a train the right over an opposing train:

- (1) has right over, to

Examples.

- (1) *No. One 1 Eng. 67, Palmer, has right over No. Two 2 Eng. 85, Bates, Mecca to Mirbat.*
- (2) *Extra 37 South, Engle, has right over No. Three 3 Eng. 105, Seton, Natal to Rattlam.*

This order gives the train first named the right over the other train between the points named.

If the trains meet at either of the designated points, the first-named train must take the siding, unless the order otherwise prescribes.

365. Under (1), if the second-named train reaches the point last named before the other arrives, it may proceed, keeping clear of the opposing train as many minutes as such train was before required to clear it under the rules.

If the second-named train, before meeting, reaches a point within or beyond the limits named in the order, the conductor must stop the other train where it is met and inform it of his arrival.

Under (2), the regular train must not go beyond the point last named until the extra train has arrived.

When the extra has reached the point last named, the order is fulfilled.

366. The following modification of this form of order will be applicable for giving a work extra the right over all trains in case of emergency:

- (3) Work extra has right over all trains between and from m. to m.

Example.

Work extra 275, Smith, has right over all trains between Manila and Honolulu from Seven 7 p. m. to Twelve 12 midnight.

This gives the work extra the exclusive right between the points designated between the times named.