

WESTBOUND TRAIN crosses Guyandot river and enters plant where two tracks fan out to four. Mechanical interlocking with colorlight signals here were formerly controlled from old DK cabin

C&O Consolidates Interlockings

All-relay plant includes controls of 15 crossovers, 11 power switches, 4 electric locks on hand-throw switches, 14 high signals and 22 dwarf signals at the east end of the Huntington, W. Va. yard area

CONSIDERABLE SAVINGS in operating expenses have accrued to the Chesapeake & Ohio since they consolidated the control of three interlockings (one new plant and two existing interlockings) into one control machine at DK cabin at the east end of the Huntington yard.

Huntington is an important coal traffic point on the C&O three-track mainline between Ashland, Ky. (15 miles west) and Charleston, W. Va. Much coal is moved on branch lines near here to the mainline where it is moved west for trans-shipment at Huntington to Ohio river barges, or for movement to the C&O's large coal classification yard at Russell, Ky. (near Ashland), from which point it is moved north and west. During the 8 am to 4 pm trick on a typical day, a total of 23 mainline trains moved through DK interlocking, of which 18 were 160-car trains, either empty coal cars moving east or loaded coal cars moving west.

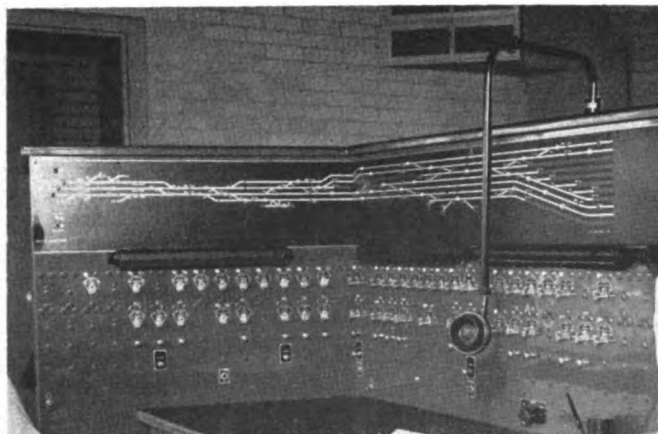
The Old—Approaching from the east, the three-track mainline narrows to double-track over the Guyandot river bridge. The crossover and power switch (M2 electric switch machines) with their associated colorlight signals at this location were known as Guyandot interlocking, which was remotely controlled from old DK cabin interlocking. West of the river, the four crossovers and four turnouts with their associated colorlight signals were known as DK cabin interlocking. In this plant four crossovers and two single switches were pipe connected to a mechanical interlocking machine, and the other two single switches were operated by M2 electric

switch machines. The yard-track switches and crossovers west of 27th St., were hand-throw, being operated by switchtenders.

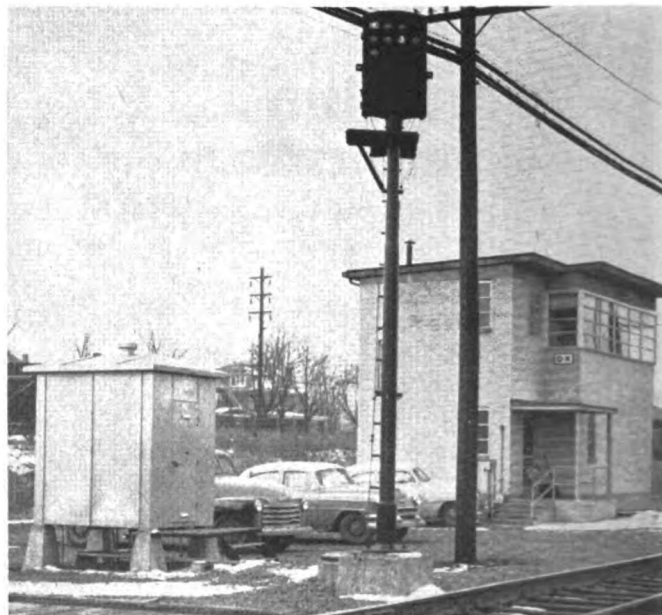
The New—A new brick tower known as DK cabin was constructed near 23rd St. at the east end of Huntington yard, and in this tower is an interlocking control machine which controls Guyandot, old DK and the switches and signals at the east end of the yard. The power switches and signals at Guyandot are unchanged; electric locks, controlled from the tower, being added at two hand-throw switches leading to industry tracks. At old DK, the mechanical interlocking was removed, the crossovers and two turnout switches being equipped with M23 dual-control electric switch machines. One hand-throw crossover was equipped with electric locks. Hand-throw stands at the switches and crossovers at the end of the yard were removed, and A-1 and A-5 electro-pneumatic switch machines were installed with associated N2 dwarf signals for yard movements, and Style R colorlight signals for main track moves. At the new tower, an electric semaphore-type, train-order signal was erected, as well as a light-type, yard-track indicator.

Panel-Type Control Machine

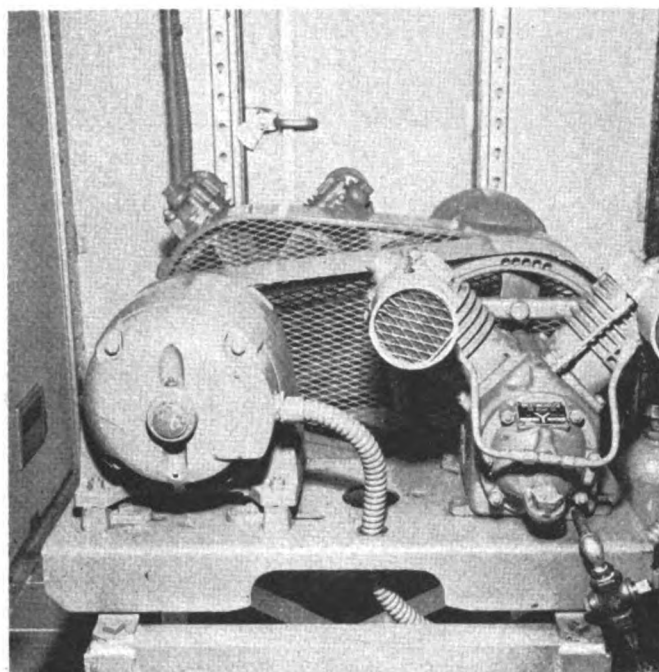
The control machine is the standard panel-type with a conventional track diagram and indication lamps. Below the track diagram are the switch and signal levers, each crossover, turnout switch and signal having its



INTERLOCKING CONTROL MACHINE has signal call-on controls



"PACKAGE AIR COMPRESSOR" is in metal housing near tower

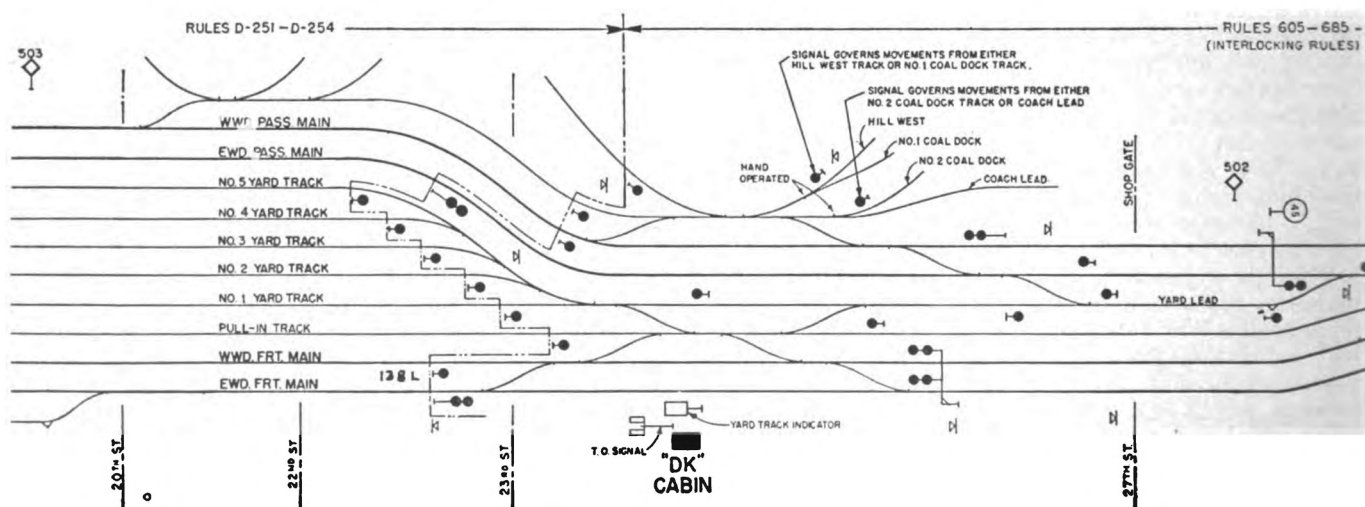


Y-TYPE COMPRESSOR delivers 13.7 cu ft of air per minute

own lever. Also included on the panel are switch levers for four electrically locked hand-throw switches, maintainer's call keys and four "horn" buttons. At the right of the control machine is the yard-track indicator control panel with key switches for the various track designations. To facilitate the changing of line-ups for switching moves, sectional route release locking was incorporated in the interlocking controls.

Warning Horns Controlled from Tower

At four locations within interlocking limits electric horns are mounted about 10 ft. above the ground, on signal or cantilever bridges, for attracting the attention of signal maintainers, track forces or train crewmen. Control buttons for these horns are on the interlocking control machine panel below their locations on the track diagram. Five short "toots" indicates that the maintainer or other men working near the horn should go to one of the wayside telephones and call the interlocking operator. Four "toots" means that the main-



D - DUAL-CONTROL SWITCH

O-EL-ELECTRICALLY LOCKED SWITCH -OPERATED BY THE OPERATOR

tainer is wanted; three "toots" is a horn test; and one long "toot" means stop. This "stop" horn is used in emergency when a train or engine is beyond a controlled signal and the operator wants to communicate with them. Upon hearing the horn, the train or engine is stopped and a member of the crew goes to a wayside phone and calls the DK operator.

Call-On Signals

Call-on controls were incorporated in the signal controls of this interlocking, and are initiated by turning the signal lever in the normal manner to clear the signal and also pressing the call-on button located below the signal lever. This will clear the signal to the call-on aspect, red over yellow (Restricting). The call-on aspect as used in this interlocking, enables the operator to clear a signal allowing an engine to enter an occupied block to recouple to its train, after setting out cars on the yard tracks. For example, a westbound coal train which is to set out cars at Huntington, pulls in on the westward freight main and stops short of 27th St. After uncoupling (the set-out cars are usually at the head end), the engine pulls down into one of the yard tracks, leaving interlocking limits. After setting out the cars, the engine returns on the westward freight main approaching signal 138L. This signal cannot be cleared to the yellow aspect because of the freight train at 27th St. But in this instance, the operator controls 138L to display the call-on aspect (red over yellow) which directs the engine to back down to the train for recoupling.

Automatic Dwarf Signal at Siding Gives Block Indications

At two electric-lock locations (one within interlocking limits, the other beyond the westward home signal at Guyandot) where the unlock is controlled by the interlocking operator, the movement from the side track is governed by an automatic dwarf signal. Switch engines working industries at these locations often pull in on these tracks to clear the mainline for through trains. After a through train has passed, the switch crew obtains permission from the leverman to use the switch. When a crew member reverses the switch to

come out, the dwarf signal will automatically give the block indication (red, yellow or green aspect).

Making Maintenance Easier

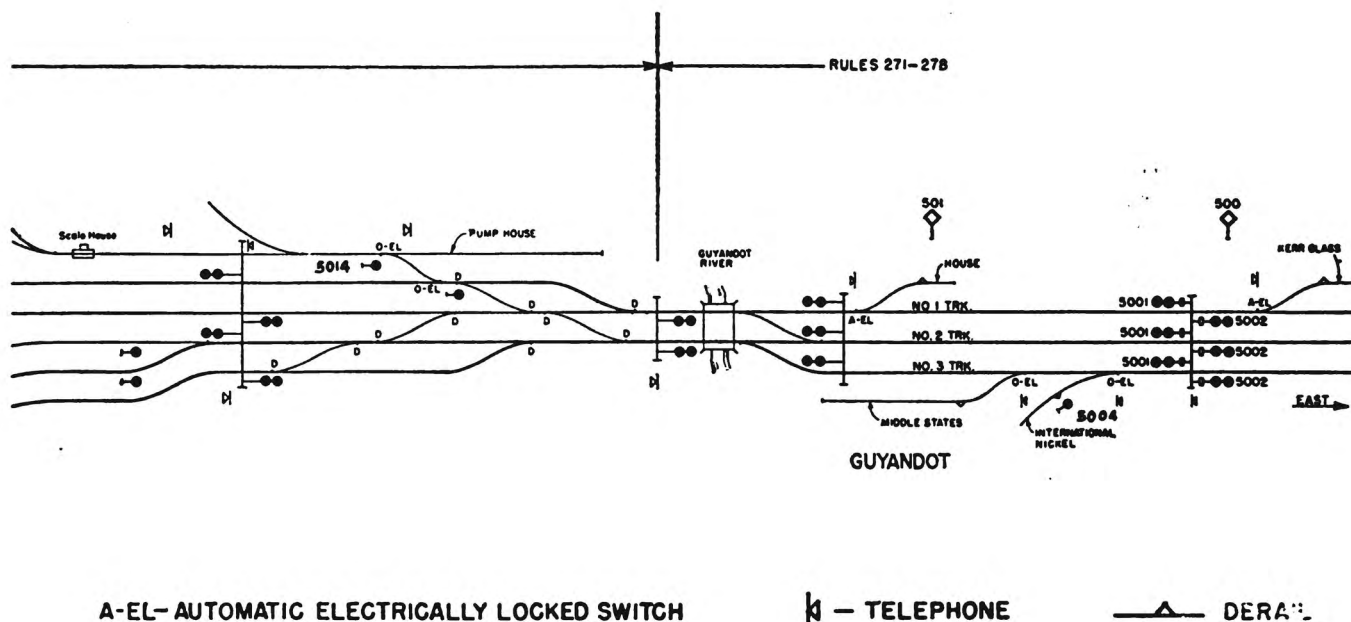
Because maintenance is continuing work at an interlocking, several features of DK are worth mentioning: (1) a two-wire block telephone line around the plant with phone jacks on the ends of every relay and signal case, as well as wayside telephones in booths throughout the plant; (2) a portable, stair-type ladder in the relay room of the tower; (3) extension light with 25 ft. of cord in a spring-return reel in each of three aisles between relay racks in the tower; (4) compressed air in the relay room for cleaning relays and shelves; and (5) terminal board in tower built in a doorway, accessible from both sides (door at rear).

Multiconductor cable for the signal and switch control and indication circuits is run aerially throughout the plant. At DK cabin, these cables are terminated in a sheet steel case outside the tower, and the circuits enter the tower underground through concrete wells from either side of the tower. Outside the tower, steel well covers (similar to battery box covers) provide access to the cable for inspection. Inside the ground floor relay room, a removable floor plate provides access to the cables where they come up through the floor at the base of the terminal board. Here the individual conductors are separated for termination. C&O practice with respect to multiconductor cable is the same whether the cable is at a terminal board in a tower relay room, at a relay case or in a relay housing: the fully insulated complete cable is brought up into the case, housing or room above the floor line and then separated into individual conductors, the separation point being fully packed with sealing compound. Thus the cable separation is dry, above low spots for water collection, and is readily accessible for inspection.

Aerial Cable is Multiconductor

The aerial cable is No. 14 from 3 to 27 conductors, with an asbestos braid. The C&O uses two track wires which are No. 9 stranded copper with $\frac{5}{64}$ in. rubber tape and braid cover. No. 9 solid copper with a metal-

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Cleveland receives the consist in the form of page printer copies and a tape. This tape is run through a tape-to-card machine to produce punched cards, one card for each car. The cards and page copies are used for records, car tracing and accounting. The punched cards are used to prepare Erie's Q.A. (Quick Action) passing reports which are sent to off-line and on-line traffic offices and freight agents daily.

A feature of the Erie's method of car reporting is that the information from the waybill is manually punched on a card at one time, and one time only. All pertinent data is included in the first punching so that the additional reports required can be obtained by machine processes with no further reference to the original waybill. The transportation office in Cleveland gets everything, and from this detailed information they are able to prepare other reports. Hammond yard office prepares the junction passing report for the traffic and revenue departments as well as the jumbo car record book for their own use, and the interchange report in lieu of typing.

The various offices which received copies of the consist being transmitted from Hammond (originally discussed) use this information for notifying shippers and consignees of car movements, and for various traffic and operating studies and reports. At Youngstown the western district general manager receives a copy of every train consist, as does the eastern district general manager at Jersey City. Approximately 125 train consists are handled daily by the car reporting system.

Advantages of New System Are Many

The advantages of the car reporting system, in which the operation of business machines and a system-wide railroad-owned printing telegraph network are coordinated, are many. These benefits are evident in yards and terminals as well as to the superintendent of transportation, car accountant, auditor of revenues, traffic department men, shippers and consignees. E. E. Seise, assistant to the president (Erie man behind the system) summarized the advantages as follows:

"Printed conductor's wheel report instead of hand prepared report.

"Printed train consists and automatic card preparation for Q.A. (Quick Action) Car Locator Service report for shippers and receivers.

"Machine-printed interchange reports replacing manual work.

"Machine-printed outbound train consist, providing an immediate check of classification and yard handling.

"An indexed yard car record printed automatically from punched cards each day showing daily records, and monthly to give permanent record. Shows arrivals of cars and forwardings. Eliminates postings.

"An easily prepared passing report, still from the original punched cards for revenue settlement with other carriers and for traffic department use.

"Advance notice from other yards in form of inbound train consist transmitted from dispatching yard.

"One punching of waybill information produces cards which are used again and again. Transcribing of information from waybills is practically eliminated after the first punched cards are prepared.

"Reduction of errors in car initial and numbers, instructions, etc., which formerly resulted from numerous transcribing operations in manual set-up.

"No loss of speed or delay to train schedules at heavy car-card-punching points (receiving yards from connections) once operators are trained and new system organized to a normal routine.

"Very little dislocation of personnel. Regular yard

personnel can readily be trained to take over the mechanical operation.

"When the communication equipment and business machines are coordinated, the adaptations are really tremendous. We are looking forward to the day when it might be possible to key punch a card from a waybill in a railroad yard on the west coast, and have that same card reproduced over and over again in each railroad yard, from the west coast to the east coast, without ever having to manually transcribe the data from the waybill. We believe the universal use of business machines in yard offices is a forward step in standardization of car reporting for all railroads; keeping shippers and receivers quickly informed about their car movements, and hence making possible more efficient operation through greater mechanization."

Carrier Circuits Added

For the past several years, the communications department has been improving circuits and installing carrier to provide system-wide printing telegraph service, the network now comprising about 4,150 circuit miles of carrier and 6,350 miles of physical circuits. Teletype circuits to off-line agents as well as TWX service to other off-line offices are leased.

The studies for the use of improved machine methods and the development of procedures for the yard and general offices are headed by E. E. Seise, assistant to the president; F. H. Menagh, superintendent of communications; and G. F. Dunathan, car accountant. The card processing machines are leased from the International Business Machines Corp. The printing telegraph equipment was furnished by the Teletype Corp., and was installed by the Erie communications department, as was the carrier equipment.

C&O Interlocking

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lic tape covering is used between the bootleg and the track battery. All insulated wire and cable were furnished by the Kerite Company.

The electro-pneumatic switches at the yard entrance are supplied with air from a Westinghouse Air Brake compressor unit which was furnished to the railroad as a "package." This "package" includes two Y-type air compressors driven by 2-hp electric motors, each compressor delivering 13.7 cu. ft. of air per minute. Both compressors automatically cut in when the airline pressure drops below 60 psi. They are housed in a steel relay housing (5 ft. by 7 ft.) with the condenser unit mounted on the outside of the housing. A 2-in. line runs from the compressors to four air reservoirs (20 cu. ft. capacity) each set inside a 5 ft. diameter concrete pipe, 4 ft. high, set down in the ground with the top at ground level. Each pipe has a steel cover which can be removed for inspection or testing of the reservoir and control valves. Branch air lines are $\frac{3}{4}$ in., all piping being galvanized iron. To prevent electrolysis of the airlines, they are covered with Tapecoat, an asphalt base compound which is applied with the aid of a blowtorch. Some sections of the airlines were also covered with 3M's Scotch wrap tape as a test.

Design and installation of the interlocking was done by the signal department under the direction of T. L. Carlson, superintendent of signals. The major items of signal equipment were furnished by the Union Switch & Signal division of Westinghouse Air Brake Company.