Railway Signaling & Communications

Trains Control Automatic Bridge

Automatic controls have allowed the St. Louis-San Francisco to dispense with the services of an attendant to control the movements of a vertical lift bridge. The bridge, on a light-traffic line, is normally in the raised position, and is lowered automatically upon the approach of a train. The circuits to accomplish the automatic operation were designed by the Frisco's communication and signal department under R. E. Troth, general superintendent, and installed for about $50,000. A 300' walkway was installed on the bridge to enable trainmen to reach the emergency pushbuttons. The project to automate the bridge, which spans the Black Warrior River at Demopolis, Ala., had the approval of the U.S. Corps of Engineers.

The bridge is on a branch line extending from Amory, Miss., to Pensacola, Fla. Approximately two miles in either direction from the bridge, short track circuits detect the approach of a train and determine the train's direction. One of these track circuits is part of an interlocking with the Southern. The other track circuit was installed especially for the bridge. The branch line is not signaled, and continuous track circuits have not been installed between these approach sections and the bridge. The approach indications are provided by inoperative signals. There is, of course, a track circuit between home signals over the bridge (5TR; 5TER and 5TSR provide loss of shunt protection). Train speed is restricted to 15 mph for southward and 10 mph for northward trains, from the approach until the train has cleared the bridge. A circuit diagram is shown on the following two pages.

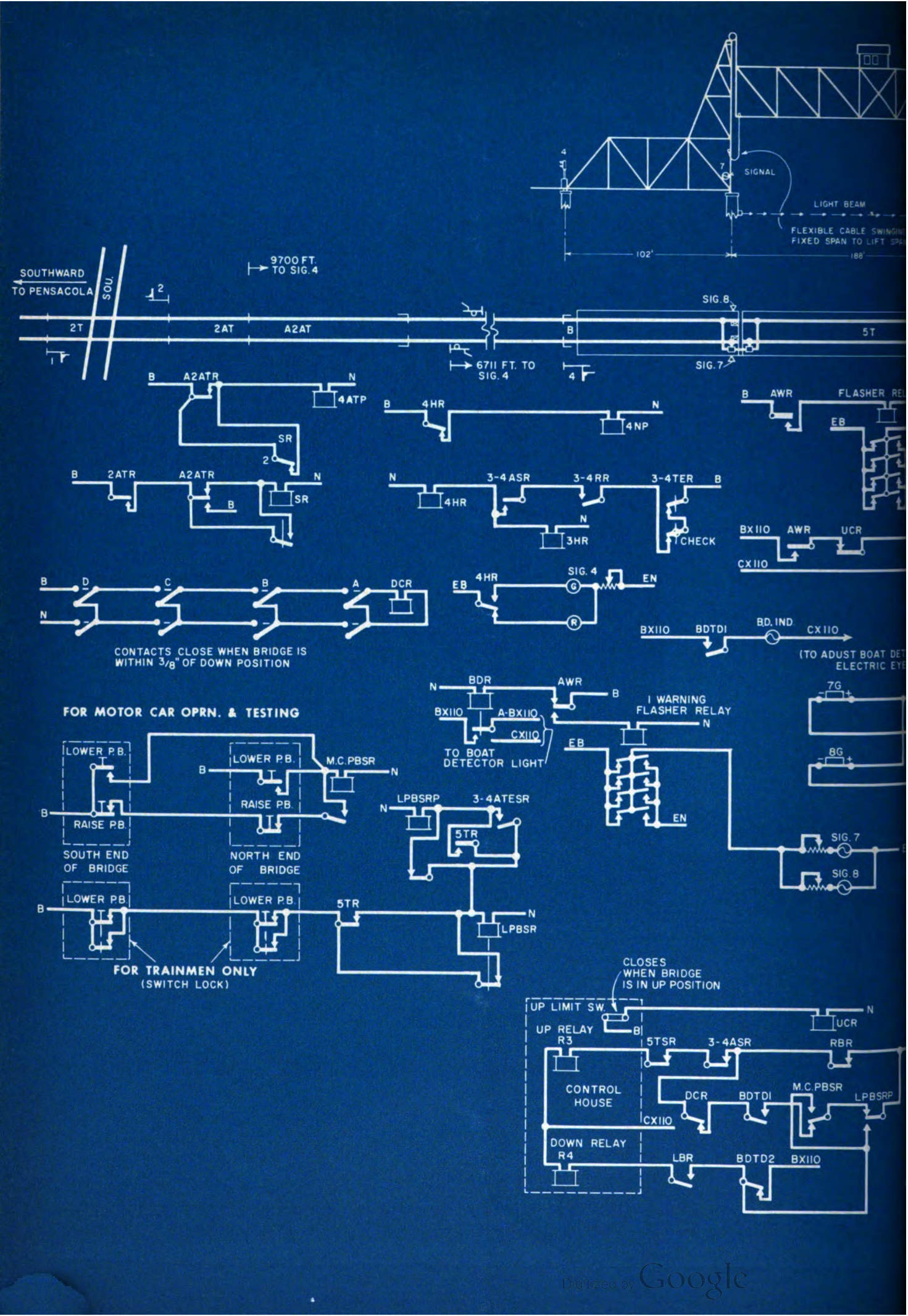
If a train is headed toward the bridge from either direction (3-4ATSR down), sirens on the bridge approaches begin to sound, and the green navigation lights change to flashing yellow (AWR down). Six minutes later (ATER) the bridge begins to descend (LBR up, RBR down), the sirens cease operating, and the navigation lights change to flashing red. The navigation lights will continue to display the flashing red aspect until the bridge is again in the fully raised position. When the bridge is fully seated (DCR up) the railroad home signals change from red to green. At this time, the train will be about 1,000 ft from the bridge. The bridge automatically rises (RBR up) to its normally raised position as soon as the train has cleared the interlocking limits over the bridge.

A light beam and a photoelectric cell serve as a boat detector. These are affixed to the piers directly beneath the lift span. The lamp which provides the light beam and the photocell amplifier are turned on only upon the approach of a train (AWR down). The projector and cell are located approximately 40" above the water line. The projector and cell cannot be optically focused, and there are no sunshields on them. Adjustment is required only when the water level changes. In the near future, this adjustment will be made automatically. Electrodes will sense high and low water and cause a motor to raise or lower the boat detector accordingly. The photoelectric cell was manufactured by the Controls Division of Infrared Industries, Inc.

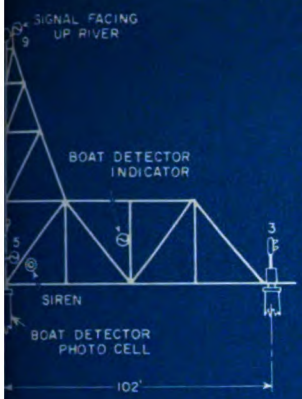
A boat detector indicator is placed on one of the fixed spans to aid in adjusting the photocell system. It is lighted when the detecting light beam is interrupted. At any time during the descent of the bridge, until the bridge is fully seated, interruption of this beam will cause the bridge to rise (BDTD1 and BDTD2 pick up). The bridge will begin to descend again as soon as the light beam is continuous.

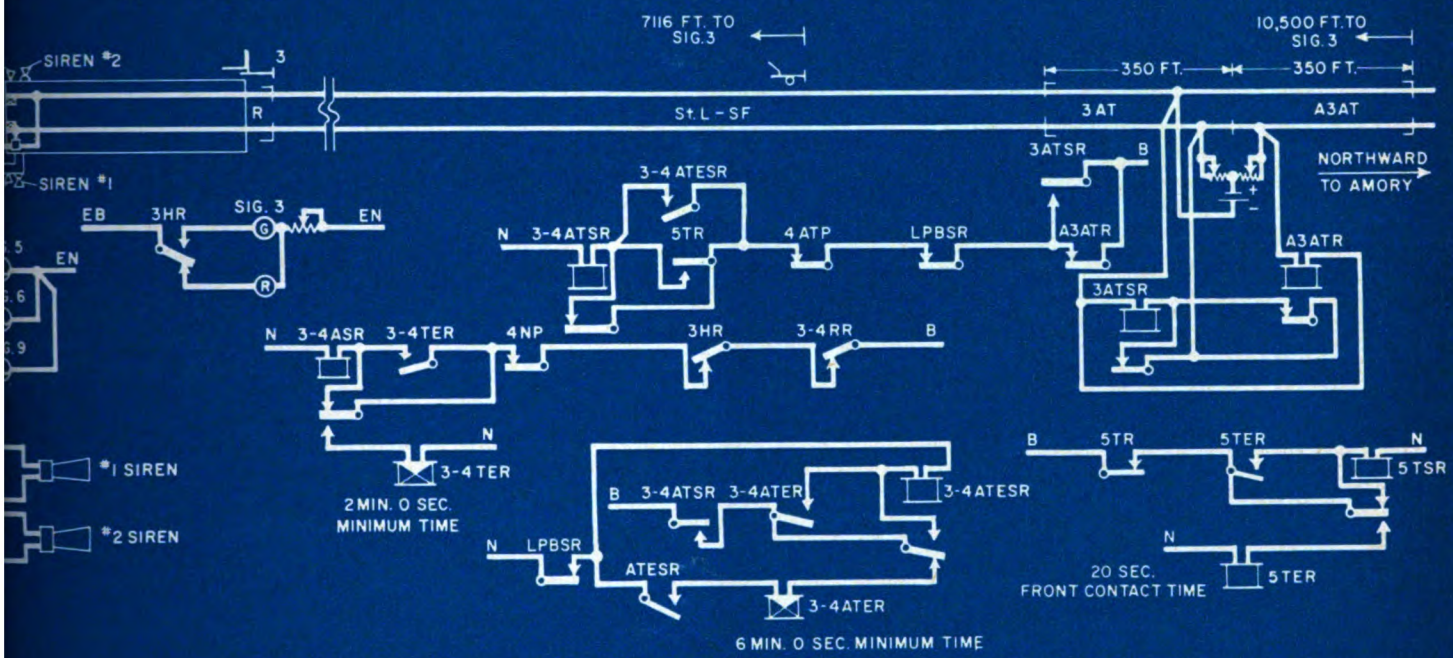
If, for any reason, the train has not accepted the green home signal at the bridge within six minutes (3-4ATER) after the lift span began its descent the home signals will change to red. Two minutes later (3-4TER), the lift span will rise. Pushbuttons, one located at each home signal and protected by a switch lock, permit the manual initiation of bridge lowering (LPBSR down) by the trainmen. When these are used, the bridge will rise automatically, as before, as soon as the train has cleared the bridge. Another set of pushbutton controls, protected by M/W locks, is also located at each home signal for the use of motor car operators and for testing of the bridge controls. These consist of separate "raise" and "lower" pushbuttons controlling MCPBSR. When the "lower" pushbutton is operated, the bridge begins to desend immediately. It will remain in the down position until the "raise" pushbutton is operated. It is the responsibility of the employee using these controls to check river traffic before causing the bridge to be lowered, and to see that the bridge is raised after he completes his crossing or testing. An "OS device" has been provided which puts an on-and-off tone on the dispatcher's line if the AC power should fail. In the event of such a power failure the bridge could be operated manually by means of a gasoline engine drive. (To conserve space, power supply and power-off circuits have been omitted from the drawing.)

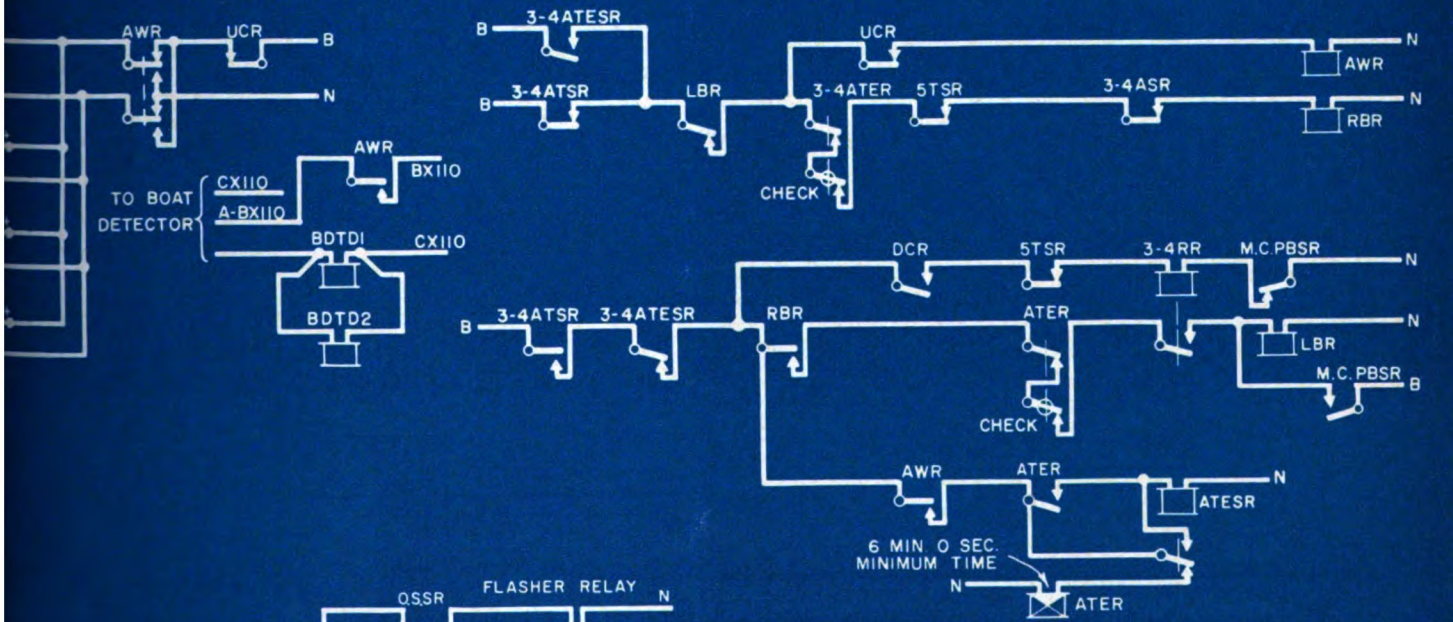
Navigation control lights are attached to the fixed spans either side of the lift span facing up and downstream. A fifth light is attached to the top of one tower, facing up-stream only. This fifth light provides additional warning to down-stream traffic during flood stage. All of these navigation lights are standard US&S searchlight-type signals. The six-minute warning time before bridge descent was negotiated with representatives of towboat operators and the Corps of Engineers. River traffic consists of pleasure craft and approximately eight tow boat and barge movements daily. Railroad traffic consists of one through freight each way per day, and one tri-weekly local. **RSC**

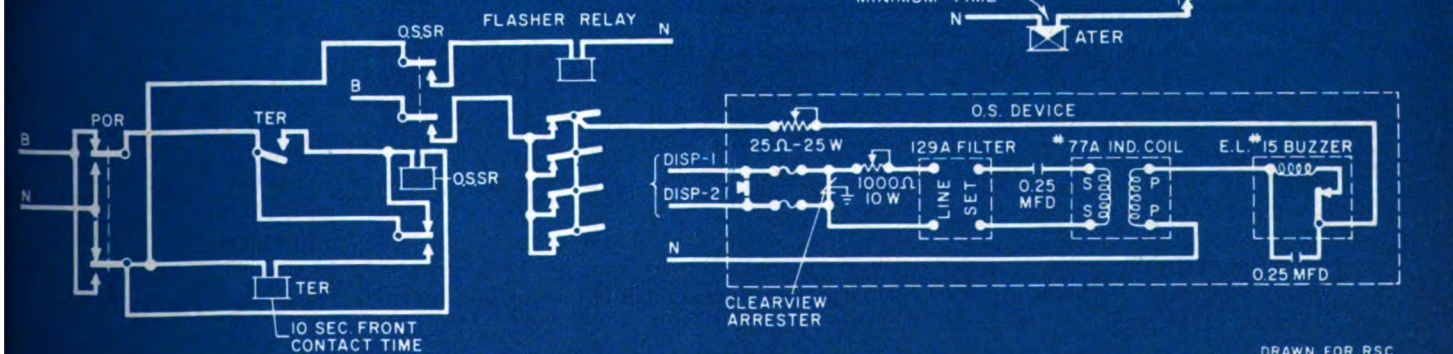


ST. LOUIS – SAN FRANCISCO RAILWAY CO.
AUTOMATIC VERTICAL LIFT BRIDGE
DEMOPOLIS, ALABAMA









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