

taken up to allow a closer inspection of the wires. This fall on our section, the only wires in crossings which were found to be damaged were apparently damaged by something dragging,

catching the wires, pulling them out, and usually breaking strands near the center of the bond. Not one of these wires had a broken strand at the plug.

Changing Relays

"When changing out a relay, what convenient means can be used to identify the jumper wires so that they will be connected properly to the relay being installed?"

Fibre Tags

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It has been the practice on the Texas & Pacific to attach a black fibre tag to each wire on a relay or terminal. This tag measures $\frac{7}{8}$ in. by $1\frac{1}{2}$ in. and has a winged hole in the top to permit the small bee wire eyelet, used on flexible wire, to pass through, but not loose enough to slip off. The tag is stencilled in white letters with the name of the circuit involved, and in red letters with the number or name of the contact and finger of the relay. With all of this information plainly shown on the end of each wire, a relay may readily be changed out without fear of a wrong connection.

Take Off Only One Nut

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First of all, one should have some means of placing the two instruments alongside of each other, in order that no complications exist while making the change. This can be done by almost anyone with almost any kind of light strap iron. The first step is to remove the old relay from its position, placing the new relay in its permanent position and placing the old relay on the temporary bracket alongside of it. If a diagram is had of the wiring, check it carefully to see that it corresponds with the wiring.

Usually there are some terminals on the relay that will not be used. Remove the nuts from all the terminals on the new relay that are to be used, checking them carefully to see that they correspond with those on the old relay in service. Next remove one nut from each terminal in use on the old relay. This will allow one to make a more accurate check, will lessen the chance of placing the wires on

the wrong terminals, and also will allow the change to be completed much more quickly. Remove the wires from only one terminal at a time, placing them in order on the new instrument, carefully checking when each change is made from one terminal on one instrument to the proper terminal on the other. The work should also be carefully checked after it is completed.

If a different type of relay is being used, one should familiarize himself with the instrument by carefully studying it before any change is made. A very good idea, especially for the beginner, is to make a sketch of the circuits and contacts before attempting to make the change.

Strict Attention Required

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Supplementing any necessary references to circuit plans and standard wiring diagrams during and after an instrument changeout, to determine positively by testing, that all involved functions operate correctly, are various methods, one or more of which are usually utilized to facilitate the changeout and lessen the possibility of error.

When practicable, the replacement relay is placed or mounted in an accessible spot within reach of the leads from the relay to be changed out. The transfer is effected by connecting the leads in a corresponding position on the replacement relay as removed, thus obviating any necessity for special markings. If, however, the terminal post arrangements of the relays are dis-similar, or it is necessary to disconnect and remove one relay from the housing before the other may be placed, a colored lead or soapstone pencil may be used to write the circuit nomenclature near the proper terminal posts on the replacement relay top plate, or, a rough

sketch may be drawn showing the physical arrangement of the terminal posts, with connecting lines to indicate the circuit paths, together with the proper circuit nomenclature.

If it is necessary to insulate the eyelets of the relay leads to prevent possible circuit damage during a changeout, this can be done with friction tape, or they can be doubled back and fastened to the proper terminal post on the case board, securing them with a few turns of the nut. Tape may also be used for identification purposes, the front, fulcrum, and back or polar leads of each relay circuit being taped together, the position identifying the proper location, e.g., front point away from, and fulcrum toward, the case terminal board, with polar or back at right angles to both.

If desired, both relays may be temporarily connected in multiple, and a meter used to check each circuit as it is transferred. Suitable preparations, such as removal of, or loosening of, nuts and placing solid wire jumpers, if any, etc., lessen materially the time required for the changeout.

Circuit Check Made

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The following procedure has been found satisfactory: The maintainer places all new jumpers on the relay to be installed, seeing that they are placed on the proper contacts so as to let the relay leads drop onto the terminals in an orderly manner. If a relay is being replaced with a different style relay, then one circuit is transferred at a time onto the new relay. Each circuit is then read through the relay to see that all circuits have the proper direction through the relay contacts. In a tower, where numerous relays are being changed, the circuits are checked against the plans. On an automatic location, break checks are made to see that the functions respond properly.

Contacts Designated

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The proper binding post for each wire will be quickly identified when a relay is being changed out, if marks identifying each post are penciled on tags which are fastened to each wire as it is being taken off the old relay. I mark the tags 2F, 3H, etc., which
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