can only be accomplished by walking over the territory to be inspected. A
cable-type bond, except in cases of
injury, rarely breaks except close to
the plug and the failure at this point
is gradual. First, one strand will
break and then the remaining strands
fail, one by one. I am satisfied that,
in practically every instance, the com-
plete failure of a stranded bond, in-
volving the successive breakage of all
the individual strands, occupies a
period of several months or even a
year.

By walking over the territory and
inspecting each end of every bond, as
outlined above, nearly all the defective
bonds will be located. These bonds
will be found to have one or several
broken strands, and replacement can
be made before they have failed.
However, if an inspection of bonding
is attempted from a motor car, or any
other vehicle, the fracture will not
be discovered until it is complete, and the
end of the bond separated from the
plug.

My experience has been that a semi-
annual inspection, as above described,
will result in the removal of prac-
tically every defective bond before a
failure has occurred. Of course, un-
der certain conditions such as light
steel and fast traffic, the periods of
inspection would have to be more fre-
cquent.

No electrical test can be relied upon
to indicate the presence of defective
bonds, as the conductivity of the angle
bars varies greatly, due to rust, loose
bolts, etc.

Lights Interfere
with View of
Signals

"What special arrangements have
you found necessary at certain loca-
tions to prevent street lights, lamps on
buildings, or advertising signs from
interfering with an engineman's view of
signals?"

Local Authorities Co-operate

O. R. Unger
Signal Supervisor, Missouri Pacific
Nevada, Mo.

Complaints arising from interfer-
ence with signal indications as a re-
sult of street lights, signs, etc.,
usually come from enginemen who
happen to be working on a division
other than that covered by their reg-
ular run. In such instances an en-
gineman will often find many de-
fects that he would not notice on his
own territory.

However, we have been very suc-
cessful in the past in remedying
these conditions. In a few instances
we have consulted with the local
street commissioner or the power
company and had the objectionable
lights relocated. In most cases they
are glad to co-operate.

In other instances we have hooded
these lights in order to overcome the
objections.

Shields Stop Interference
Caused by Street Lights

P. A. Starck
Assistant Signal Supervisor, C. & N.W.,
Sioux City, Ia.

Newly-installed street lights,
stands on buildings, or advertising
signs are often found to interfere
with an engineman's view of some
signal. We recently encountered a
case of this kind involving a street
light so situated as to be directly
back of and very nearly in line with
the home signal light of an inter-
locking plant as seen by the engine-
man of an approaching train.

This particular case was corrected
by mounting a 3-ft. square sheet-
metal shield between the street light
and the signal. It so happened that
a line pole already in use for other
purposes was properly situated with
reference to the offending light and
this pole was utilized for supporting
the shield.

The shield effectively corrected
the situation. The same method has
been applied at a number of other
places effectively. Sometimes it is
found necessary to set a new pole
or to move a nearby pole to the
proper location for the purpose of
supporting the shield. Where it is
necessary to set a pole, it should be
placed as closely to the interfering
light as local conditions will permit
in order that the shield may be small
but yet effectively cover the light.

There have been several instances
particularly at flood-lighted proper-
ties located in the immediate vicinity
of highway crossing signals where
the relative alinement of the protec-
tive devices and flood lights was
such as to render the lights in the
signals ineffective. At a number of
such places the undesirable condi-
tion was corrected by simply re-
fo rumg the flood lights and chang-
ing their adjustable hoods and re-
flectors so as to shift their principal
focus away from the signals. In all
of these cases the proprietors of the
establishments co-operated by per-
mitting the readjustments to be
made upon being informed of the
circumstances.

Less Trouble with Color Lights

A. J. Yarrell
General Signal Inspector, Texas &
Pacific, Dallas, Tex.

Only one case of an obstructed
signal indication has come to my at-
tention on the Texas & Pacific. This
was remedied by adding about
10 ft. to the color-light signal mast;
preventing a new train shed over a
station platform from obstructing
the view.

When we prepare the location
plans for a new signal installation
all such obstructions as mentioned
in the question are carefully con-
sidered and the signals are located
accordingly. Where it has been
necessary to relocate signals in the
vicinity of new underpasses, etc.,
we have experienced very little diffi-
culty.

Of course, most of our signals are
of the color-light type. In my
opinion they have some advantage
over the semaphore type in this re-
spect.

Testing New Interlocking

"In testing a new interlocking prior
to placing it in service, which of the
following methods do you consider the
most reliable: (a) An operating test
each individual function under all
normal conditions or (b) detailed
checking of each branch of all cir-
cuits according to the circuit plan?
Why?"

Light Engine
Used in Testing

J. H. Butridge
Chief Signal Inspector, Illinois Central
Chicago

In testing a new interlocking plant
before placing it in service it is most
important to check all circuits against
the wiring plan. Such tests can be
made by the wireman who handles
the work and after completing these
tests he reports that the circuits
are ready for inspection.

A competent inspector working
with the signalman performing the
work should check each individual
circuit and the tagging against the
circuit plan. In my opinion no plant
should be put in service until there
is absolute assurance that the circuits
(Continued on page 44)
are in accordance with the plans furnished for the work.

After being placed in service the plant should be tested under actual operation. In testing large interlocking plants on this road we have used a light engine running backward and forward over all possible routes in the plant. One signalman is placed on the engine, who makes inspection of the signal indications and instructs the engineman in regard to the speed of the engine through the plant. Inspectors are placed in the tower to make a complete check as the engine moves over the track circuits and if any bad shunting conditions exist they are taken care of and the test repeated. A test under actual operating conditions is essential as there may be some mistakes in the circuit plan which can be discovered with this test.

**Portable Telephone Useful in Testing**

*B. F. Oler*

Assistant Engineer, Pennsylvania
New York, N.Y.

In testing a new interlocking prior to placing it in service, I would not consider the test complete nor reliable unless detailed checking of each branch of all circuits, according to the circuit plan, had been completely carried out, and an operating test of each individual switch and signal function had been made.

Usually the tests are made under traffic. With sufficient help and the use of portable telephones so constructed that they can be used on the interlocking circuit wires, the tests can be made without loss of time and without interference with traffic.

**Both Operating and Circuit Tests Essential**

*H. A. Appleby*

Assistant Signal Engineer, A. T. & S. F.
Amarillo, Tex.

An interlocking plant should never be placed in service until a complete set of operating tests for all possible combinations of conditions has been made. This test not only checks construction but also checks errors in design. All construction errors cannot, however, be found by the operating tests and a detailed check of each circuit should be made before it is placed in service, for the same reasons that these circuit tests are repeated periodically after the plant has been placed in service.

My experience has been that the operating tests and circuit checks are equally important, and neither is complete without the other. We insist that both operating tests and circuit checks be made before new or repaired installations are placed in operation.

**Complete Operation Test Often Impracticable**

*W. N. Hartman*

Assistant Signal Engineer, Chesapeake & Ohio, Richmond, Va.

The question pre-supposes that complete tests of the interlocking can be made prior to placing it in service, which in actual practice is seldom possible. The majority of new interlocking installations consist of conversions from mechanical to power-operated switches in remote-control or C.T.C. projects where complete operating tests of each individual function before it is placed in service are impracticable.

Even though an entirely new group of switches and crossovers is to be interlocked, the layout is almost invariably located in existing main tracks requiring placing in service under traffic. With this condition, automatic signals or other existing signal facilities are so involved as to necessitate deferring some of the operating tests until the circuit changes incident to the interlocking installation have actually been completed and the facilities, in their entirety, placed in service.

Both methods of testing are essential. The check designated as method (b) detailed checking of all circuits, should be made prior to placing in service, so as to correct all irregularities in the wiring which might result in failure of any of the functions to operate as intended.

The check designated as method (a) operation tests, is necessary in order to detect possible errors in circuit design as well as defects in equipment or auxiliary apparatus which, even though wired in accordance with the circuit plan, would result in interruptions adversely affecting the movement of trains. As many of these checks as operating conditions will permit should be made prior to placing the facilities in service, and the balance completed as soon as practicable thereafter.

Operating tests of each individual function under all abnormal as well as normal operating conditions, are also essential in order to simulate conditions which might be rarely encountered in normal service. This should consist of conducting complete break checks of each individual circuit, hav-

**Phantom Indications**

"What improvements have been or can be made to reduce the phantom indication on flashing-light type highway crossing signals?"

*O. S. Field*

Engineering Department, General Railway Signal Company, Rochester, N.Y.

It is our belief that the objections to phantom indications from this type of signal are not of great moment. The normal alternately-flashing indication is inherently distinctive from the two stationary lights caused by reflection and from the single fixed light displayed when the signal is operative with the flashing relay not working. From the writer's limited observation, practically every motorist is fully aware of these differences.

It would seem of much greater importance to educate the public to the meaning of the bright alternately flashing lights, than to spend effort on trying to reduce a weak stationary phantom.

We recognize that a small percentage of signals are so located that phantom from the sun occurs during the early morning or late afternoon on clear days. In such instances almost complete elimination of phantom may be secured by the use of doublet lenses in place of the more efficient roundel and reflector.