ELECTRICAL WORLD

JANUARY 1993 Vol. 207 • No. 1

SPECIAL FEATURE

The big issues for 1993: Top utility executives analyze the year ahead

Helicopter installs anti-galloping devices on hot 345-kV line

Making problem-free anchor installations

SPECIAL REPORT

DSM: Skepticism fades as saturation and spending increase

Collaborating power quality with customers

What makes a top meter reader?

Florida utility plans coal-fired unit with SCR

This year's winter peak will be higher than 1992's

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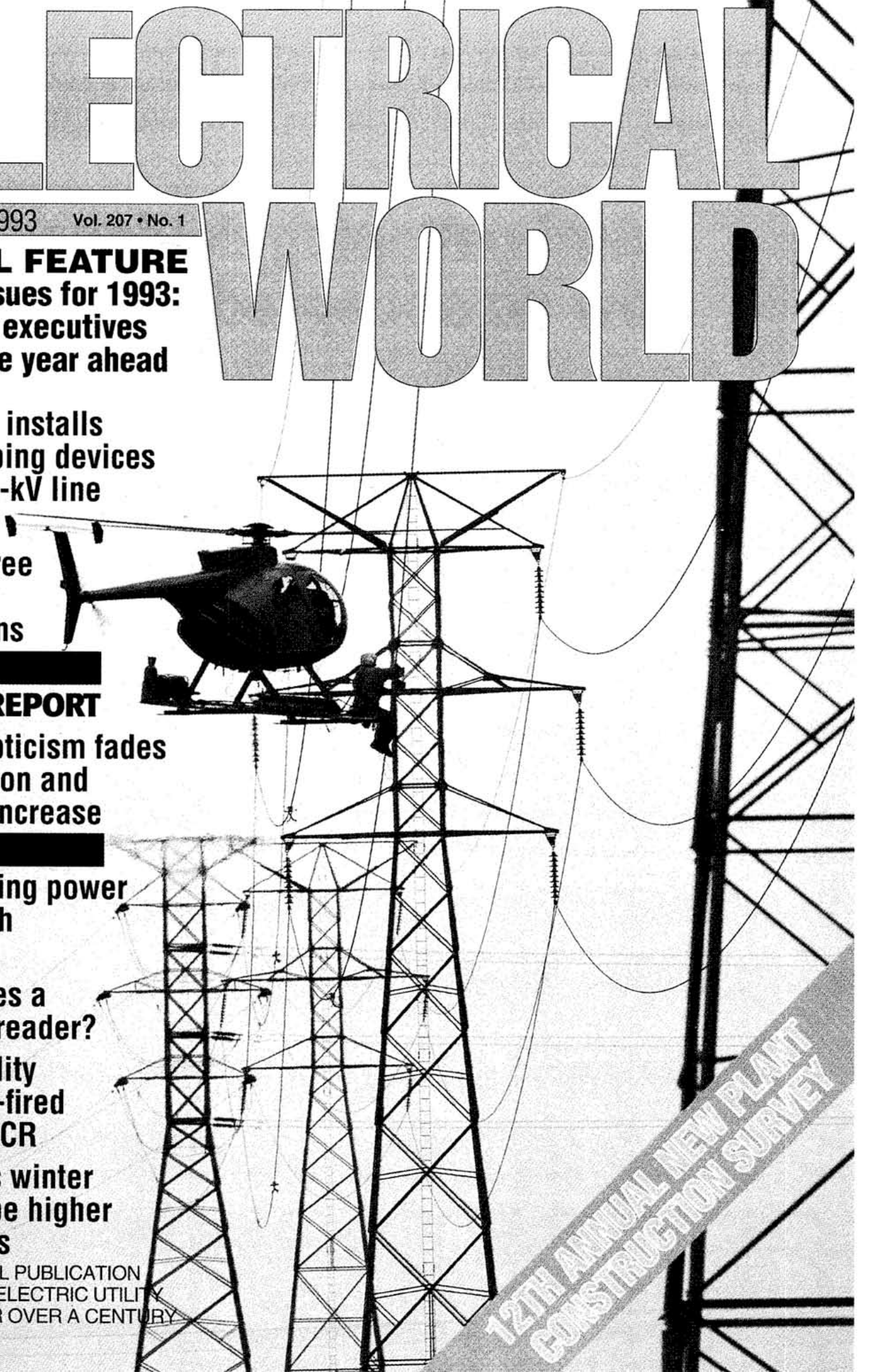

12TH ANNUAL NEW PLANT CONSTRUCTION SURVEY

TRANSMISSION & DISTRIBUTION

3. Windampers are spaced one-third of the span length from each tower. Two devices are needed per span-phase (above)

4. Anit-galloping device (right) is constructed of aluminum and sized for the conductor diameter and length of span. Weight is up to 33 lb

5. Helicopter is electrically bonded to the transmission line for all hot-line installations (left)

6. Windamper is clamped to conductor with two bolts. For higher voltages, bolts are equipped with anticorona donuts (right)

dampers on the 345-kV line (Fig 3) were determined from the air by running a Haverfield-designed measuring wheel along the static wire. Locations on the 138-kV line were determined by Nipsco personel using measurements on the ground. A total of 564 Windampers were installed over a period of 15 days. Under ideal weather conditions the crews were able to install 90 devices in one day.

To perform the live line work with maximum safety, the line worker sits on a platform attached to the helicopter skids and is dressed in a hooded, conductive suit that is electrically bonded to the helicopter. As the helicopter approaches the live line, the line worker first contacts it with a long conductive wand that is also bonded to the

Galloping of transmission lines: An elusive problem

Galloping of transmission lines occurs only under certain combinations of wind and ice buildup on the conductor. The ice, which may be only a few millimeters thick, or about 10% of the conductor thickness, creates an airfoil that produces lift on the conductor. Galloping motion is elliptical and can reach amplitudes of several feet—often greater than the normal vertical clearance between conductors.

One problem is that galloping often occurs at night when no one is around to witness it. Even when it does occur in daytime, visibility often is poor. Also, not all cases of galloping produce fault currents and breaker operation, though there are known cases where several hundred trips have occurred during a single storm. A multiplicity of factors, many of which cannot be controlled, affect whether or not a given span will gallop. There are even reports of one phase conductor in a span galloping, while the other conductors remain stationary.

Numerous devices have been designed and applied to transmission-line conductors in an attempt to control damping (EW, July 1989, p 43). Some of these act to damp the galloping motion; others prevent the airfoil-like ice buildup on the conductor surface. Biggest problem is the unpredictable nature of galloping, and hence, the difficulty of demonstrating the effectiveness of any one device. Several years of experience may be needed, during which the number of flashovers and breaker trips on unprotected lines can be compared with lines in the same region that are equipped with anti-galloping devices.

On transmission lines in the US, the most widely used device is the Windamper. The utility with the most experience in the use of this device is Niagara Mohawk Power Corp. Another device in use is the AR Twister—a aluminum weight that is clamped at an angle to the conductor. When galloping begins, this device twists the conductor and dumps the aerodynamic lift effect of the ice aerofoil. Also available for bundled transmission lines is the spacer/damper, which creates damping by absorbing energy in the movement of the subconductors in a bundle.

helicopter. Once contact is made, the helicopter closes on the line and bonding jumpers are clamped to it so all equipment and the lineworker are at line potential.

With the helicopter hovering, the line worker clamps the Windamper to the line with two bolts, equipped with corona donuts if required (Figs 4-6). When the installation is complete, the wand is again placed on the line before the bonding jumpers are removed. As the helicopter flies away, the line worker keeps the wand in contact with the line until he/she is well clear of the arc that is drawn out upon electrical separation.

Because airborne lineworkers can detect minor line problems from the air that may not be visible from the ground, they are generally equipped and prepared to do additional unexpected repairs. During the Windamper installation at Nipsco, Haverfield lineworkers made two armor-rod repairs on phase conductors and two similar repairs on overhead ground wires. ■

—John Reason, Senior Editor