WHY DO WE DO THAT?

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FIREFIGHTERS HAVE MUCH MORE ON THEIR TRAINING plate today than I did when I entered the fire service. Bunker gear, extrication tools, rabbit tools, reciprocating saws, rapid intervention teams, incident command, truss roofs, terrorism, and a whole host of other topics were not part of my training burden. Unfortunately, not much has been taken off the firefighters' training plate while much has been added and continues to be added. Still, today's firefighters, like the firefighters of yesterday, need to know not only how to do things but also why to do them. Leaving out the why leaves the firefighter only half-educated. Let's continue to look at why we do what we do.

PORTABLE LADDER PLACEMENT

We place portable ladders differently at different locations. For example, we place the tip of the ladder two feet above the roof or parapet, level with the windowsill, and two feet above a fire escape railing when placed alongside the fire escape or a few inches above the top rail of the fire escape when placed against the fire escape. Why?

• Window. When we place a portable ladder at a window for the purpose of entering or exiting the window, we place its tip level with the sill, which gives us the maximum amount of open space for entering and exiting the window (photo 1). This becomes extremely important if we must exit the window quickly because of deteriorating interior conditions. For every inch of ladder that extends above the windowsill, there is one less inch of space available for us to exit the window (photo 2).

If the heat in the room has increased dangerously or if fire is already venting out of the upper portion of the window, a ladder protruding above the sill may prevent us from exiting the window, because doing so would necessitate our climbing up over the ladder tip and into the upper flame or heat-filled portion of the window.

• Roof. For roof access, the tip of the ladder is placed at least two feet above the roof or parapet (photo 3). When it is placed this way, a firefighter can grasp the tip of the ladder while climbing on or off the roof. This allows for easier and safer access to or egress from the roof. In addition, should the firefighter need to exit the roof quickly, he will see the tip of the ladder protruding above the roof's edge and know exactly where his escape route is. A ladder placed level with the roof or parapet would not only be invisible from the roof but would necessitate that the firefighter probe blindly down with his leg to find a ladder rung to descend. He might have to do this with nothing to hold onto. In smoke, dark of night, an emergency, or even under nonemergency conditions, this would be a much more difficult and dangerous operation.

(1) A ladder properly placed at the window (interior view). (Photos by author.)

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• Fire escape. When placing a portable ladder against a building wall alongside a fire escape, place the tip one to three feet above the fire escape's top railing (photo 4). This allows the firefighter to hold onto the tip of the ladder as he climbs off or onto the fire escape.

(2) An improperly placed ladder blocks exiting from the window (interior view). Even if the upper sash and mullion were removed, it would still block egress.

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When placing the ladder against the fire escape railing, place the tip slightly above the fire escape's top rail (photo 5). This enables a firefighter to easily swing a leg over the rail while holding onto the top rung of the ladder or the fire escape rail, allowing him to step down onto the fire escape or off the fire escape and onto the ladder.

POWER LINES

Firefighters approaching a downed power line might feel a tingling sensation in their feet and legs. Should this happen, we are advised to stand on one leg or with both feet close together and to hop away from the downed power line. Why?

Electrical current can pass through even dry ground, charging it. The voltage will be strongest near the source, the downed wire, and become weaker as it radiates out from the point of contact. This phenomenon is called "ground gradient"; a diagram of it would look sort of like a series of irregular concentric circles expanding out from the downed wire (Figure 1). As you approach the downed line, current can pass into and up one leg and down and out through the other. This is "step potential," or the movement of the ground gradient electricity passing through the body from areas of different electrical potential between your two feet. (The area between the lines of the concentric circles each has a different electrical potential.) This is the cause of the tingling sensation that you feel. It is a warning. You could be in danger of being electrocuted, and your firefighting boots won't protect you. This is not a common occurrence, but it is a real possibility.

3 A ladder properly placed at a parapet.

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If you feel this tingling, you should stop your advance and place both of your feet close together, thus reducing the difference in electrical potential between them, or stand on one foot, totally eliminating the difference. The next action you should take is to hop away from the downed wire. As you distance yourself from the wire, the amount of voltage will lessen; with each hop, you should be safer. Better still, don't approach a downed power line, and you won't have to attempt to imitate a frog while dressed in bunker gear and wearing SCBA.

METAL DECK ROOF AND SPOT FIRES

An engine officer fighting a fire in a building with a metal deck roof might instruct the nozzleman to direct the stream up above the fire and to play it across the underside of the roof even though there is no obvious fire burning overhead. Why?

(4) A ladder properly placed alongside the fire escape railing.

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Metal deck roofs are often covered with built-up roofing composed of insulation, tar-like adhesive, and felt roofing or tar paper. As the roofing is heated by the fire below, the adhesive liquefies and starts to drip down through gaps in the sheet metal roof. You might feel hot tar dripping on an exposed portion of your wrist or neck. When you exit the fire, you would see cooled drips of this substance adhered to your helmet and bunker coat. These drips of melted adhesive can ignite and fall to the floor, starting spot fires wherever they land.

(5) A ladder properly placed against the fire escape top rail.

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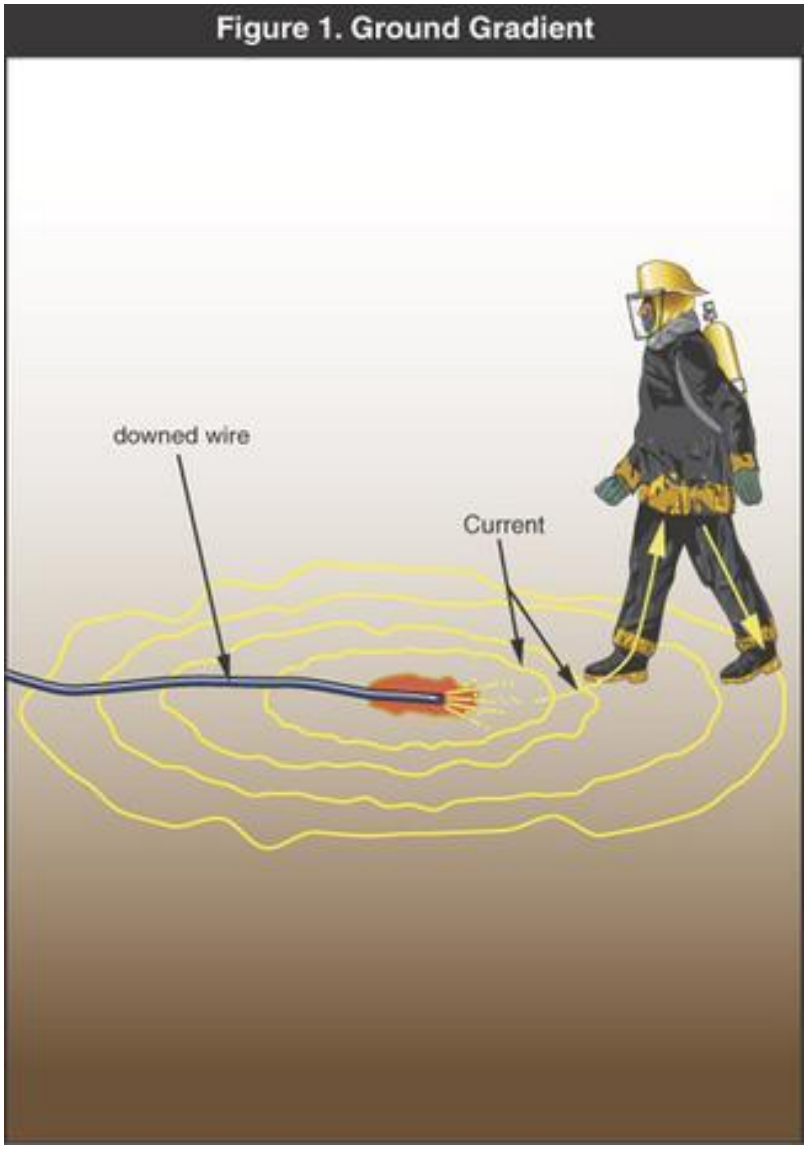
In addition, as Frank Brannigan points out in his book Building Construction For the Fire Service,[1] when sufficiently heated, the adhesive emits a flammable gas, which escapes through the gaps in the metal roof down into the occupancy below. This gas can ignite and, as a result, heat up the underside of the roof, generating additional flammable gas, which also escapes down through the roof and ignites. The result is a self-sustaining roof fire. Playing the hose stream on the underside of the roof stops the generation of flammable gases and freezes the melted adhesive in mid-drip, creating what looks like a black licorice icicle. An additional benefit of hitting the underside of the roof with the hose stream is that if the roof is supported by lightweight metal truss construction, cooling the metal truss will freeze them in place and prevent or minimize truss failure.



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I have found a similar problem with a dripping tar-like substance when certain types of membrane roofing burn. At one membrane roof fire in a multi-occupancy commercial building, these dripping flames fell down into the various occupancies and started numerous spot fires. We had to find these spot fires and extinguish them. Deploying multiple handlines to quickly apply water to the underside of the roof prevented fire extension to some of the occupancies and resulted in the above-mentioned licorice icicle formations.[2] ■

Endnotes

1. Brannigan, Francis L. *Building Construction for the Fire Service*, *Third Edition*, National Fire Protection Association, 1991, 306.

2. Montagna, Frank, “The Hazards of Membrane Roof Fires,” *Fire Engineering*, July 1998, 61.