



# BRIDGE THE GAP

CONSULTANTS AND EXPERTS TO THE CONSTRUCTION, INSURANCE AND LEGAL COMMUNITIES

SUMMER 1992

PROPERTY/CASUALTY EDITION



## Open Forum

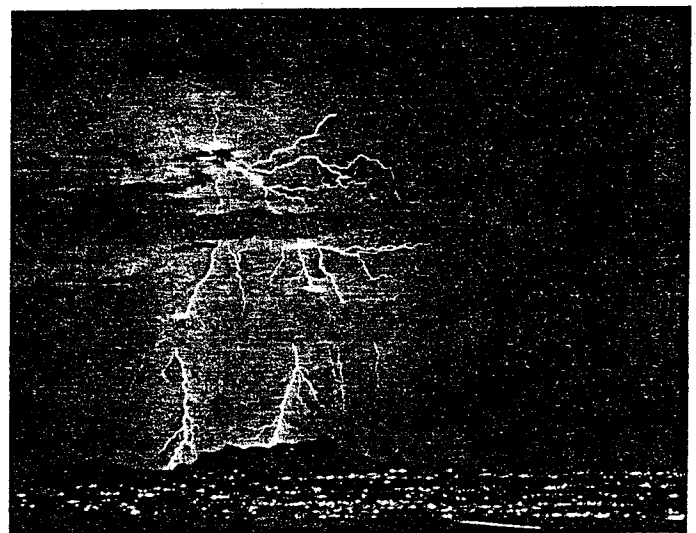
### LIGHTNING CLAIMS

Ah!, springtime. Mild temperatures. New foliage on the trees. Flowers and shrubs in bloom. Baseball season starting. Spring showers, - Lightning!! Yes, with everything else that spring brings, it also brings lightning claims. (Sometimes whether there has been lightning or not!)

The lightning bolts you see are channels of pulsing electric energy two inches across. They may be as short as 200 feet or as long as 20 miles. They travel through the air at 90,000 miles per second; nearly half the speed of light, and heat up the surrounding air to 50,000 degrees Fahrenheit, five times the temperature of the surface of the sun.

Although three-quarters of the bolt's energy is used up in heat, enough remains to deliver a full 125 million volts of electricity. With one hundred lightning bolts blasting the earth every second, lightning provides more energy than all the electric generators combined in the United States. It is also a major cause of power outages in this country as well, bursting transformers with its sudden surges of power.

It should come as no surprise to the readers of this newsletter that lightning accounts for hundreds of millions of dollars' worth of property damage every year. It also generates more property claim related business for



FORCON than any other single type of occurrence, particularly in the southeast. That is why we have devoted this entire issue of Bridge-the-Gap to some of the various types of lightning related claims we get involved in, and what we've learned about them.

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#### Open Forum

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## RESIDENTIAL SATELLITE RECEIVER SYSTEMS

In most rural areas of the country where there are no cable TV systems yet. It has become common for homeowners in outlying communities to have sophisticated satellite receiver systems. Unfortunately for the insurance companies that provide property coverage on these residences, satellite receiver systems are highly susceptible to lightning and lightning induced electrical surges.

A combination of factors makes these claims ones that the adjuster needs to be wary of -

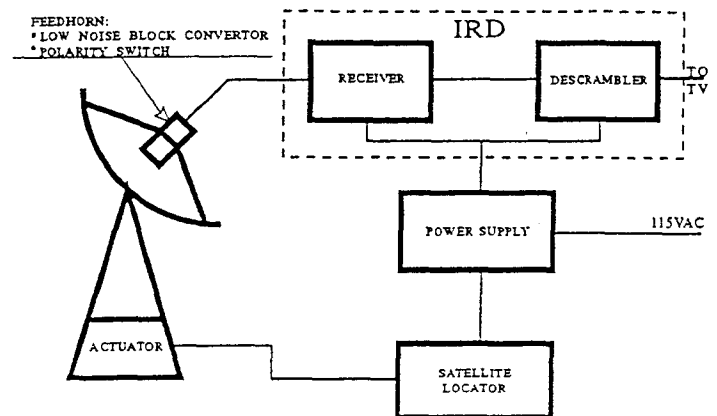
- cost - satellite receiver systems range in cost from approximately \$1,500 to about \$4,000.
- technology - like computers, satellite receiver system technology has evolved rapidly. Systems that were purchased in the late 1980's may now be obsolete and no longer manufactured. New systems are more sophisticated and provide a strong enticement to the homeowner to upgrade his system
- newness of the industry - there are a great number of satellite TV companies out there, most of which haven't been around for very long. Many may see it as an opportunity to make a quick buck.
- profit motive of the industry - most satellite TV sales and service companies are not capable of doing much in the way of repairs. To get something repaired they have to send it to the manufacturer. They do not make much profit on this and the homeowner is not excited about waiting for the repairs to be done. It is easier, and much more profitable for the company to put in new components or a whole new system and justify it by saying that the damage cannot be repaired economically.

While most lightning damage claims on satellite receiver systems may be valid as to the cause of the damage because of the susceptibility of these systems, our experience to date indicates that the dollar amounts claimed are much higher than they should be. If you resolve these claims by accepting the service company's statement that the damage cannot be repaired economically, and without determining whether the proposed replacement components are equivalent to the ones they are replacing, you are probably paying much more than you need to.

The question then is - What can you do about it? Well first, it would probably help for you to know a little more about the technology you're dealing with and how lightning can effect it.

## SYSTEM DESCRIPTION

A typical residential satellite receiver system is depicted in the block diagram below.



RESIDENTIAL SATELLITE SYSTEM BLOCK DIAGRAM

The most recognizable part of the system is the dish antenna which is located in the yard or on the roof of the house. Mounted on the dish antenna are signal processing electronics, and a drive system (actuator) to move the dish so that it can be pointed at the desired satellite. The signal processing electronics located in the feedhorn include a low noise block convertor (LNB), and the antenna polarity switch. The remaining four functional components (Receiver, Descrambler, Power Supply, and Satellite Locator) are normally located in the house in close proximity to, if not on top of, the T.V. set.

Here's how it all works! Satellites receive signals from the various T.V. station transmitters and retransmit the signals back down to earth over a wide area. The satellite receiver dish gathers these signals along with whatever other energy it intercepts. This energy is then reflected and focused by the dish into the feedhorn waveguide aperture. A small antenna in the waveguide captures this energy. The polarity switch aligns the antenna so that the signals can be kept separated from one another.

The antenna in the waveguide is connected to the LNB which provides low noise amplification of the signal and conversion of the transmitted frequency to a level that allows the use of low cost coaxial cable to carry the signal to the in-house receiver without serious signal loss. In some older units there is a separate low noise amplifier (LNA) followed by a downconverter instead of a single LNB.

The function of the receiver is to select the desired T.V. channel from all those presented to it by the LNB and then perform other functions in order to extract the video and audio signal that a T.V. can accept. The receiver is a complex device performing numerous functions. It is normally micro-processor based.

Since the companies that operate the satellite T.V. networks want to make a profit they do not want everybody to be able to monitor their broadcasts without paying and therefore the industry has adopted a standard for scrambling their signals for which the consumer must pay a royalty to have the capability of viewing any or all of the T.V. channels broadcast. When you pay your royalty your descrambler, which is a physical entity and which you must purchase, will be provided with the programming to descrambler that set of T.V. channels you subscribed for. A descrambler is not required in a satellite receiver system. Just as in a cable T.V. system there is a sub-set of channels that are not scrambled and are broadcast in the clear that anyone can monitor.

Most systems sold today have the capability that the subscriber can select which satellite is to be monitored and the system will point the dish at that satellite. For this to occur the dish antenna must be fitted with an actuator, normally a DC motor driving a screw driven arm, and dish position sensors, normally magnetic reed switches today but some existing older units used potentiometers. With the dish antenna so equipped the functional block called satellite locator, when told which satellite, will drive the dish till the position feedback indicates that the dish is pointing at the selected satellite.

The remaining functional component of the block diagram found in the residence is the power supply. It is rare to see this component as a single standalone unit as it is normally incorporated into each of the electronic units that comprise a given satellite receiver system. Its function is to connect to the residential source of 115 VAC power and convert it to the differing levels of DC voltage required by the unit(s) it serves.

The four major functional components that normally reside in the residence, the receiver, power supply, satellite locator and descrambler today are packaged in one unit which is referred to as an IRD, Integrated Receiver Descrambler. The function of the satellite locator is then programmed into the receiver micro-processor and is no longer a physically separate entity. It is still common today to find the receiver, descrambler and satellite locator each housed in their own chassis with power supply. These are units of vintage mid-late 1980's. In all units regardless of how the functional components are grouped for packaging, the descrambler is a separate PC board which is removable and may be taken directly from one manufacturers unit and put into that from a different

manufacturer. This is so because all the descramblers are built by one manufacturer, General Instrument, who has the copyright on the scrambling and descrambling algorithms adopted by the satellite T.V. industry today.

## LIGHTNING SUSCEPTIBILITY

As we mentioned earlier, satellite receiver systems are highly susceptible to lightning damage. The amount of damage caused by the lightning strike will depend upon the proximity of the strike. A direct hit by lightning is not the norm, and indeed if it did occur one would look for the smoking crater and replace the entire system. Electrical damage occurs when lightning strikes nearby tall objects such as trees and power transmission towers. These are the type of lightning strikes that we are most often dealing with.

When lightning strikes it creates electric fields in the air which can induce voltages into electrical system wiring such as the utility power system. Power line surges can be created if the utility takes a direct hit on a transmission tower or even induced into the local distribution system wiring by a proximity strike. A power line surge will be the result with only its intensity unknown. This is probably the more common cause of satellite receiver system damage and will normally effect other electrical appliances in the residence at the same time. The power line surge can do more damage if the receiver system is in use at the time of the incident since then the power supply regulating circuitry can be overwhelmed causing abnormally high DC voltages to be produced which can then damage the units the power supply serves as well as the power supply itself. Knowing that the system was not in use at the time of the strike does not mean that no damage is expected, only that the damage may be localized within the power supply.

If the electrical utility power system is not effected, the satellite receiver system could still be damaged by the electrical field inducing voltages into the dish antenna. This could effect the in-home components by coming into the house via the cables normally buried in the ground. If the lightning strike were to cause large ground currents to flow, these could induce voltages directly into the buried cable with the same damaging effects. In this situation one would most likely lose the LNB on the feedhorn, maybe even the coax cable to the receiver, the IF section of the receiver and possibly the circuitry in the receiver driving the polarity switch. If it was a strong hit, the damage to the receiver could be more extensive but normally the power supply would survive.

## CLAIM CONSIDERATIONS

When a claim is made for loss of all or part of a satellite receiver system 90% of the time the insured's

## COMPUTER SYSTEMS

serviceman will state that the equipment is unrepairable and needs to be replaced with new. The claims adjuster has to then make three main determinations (1) was lightning the cause of loss, (2) can the equipment be repaired, and (3) if it is to be replaced, is the proposed equipment the most comparable to that lost.

Determining the cause of the loss, especially where there are no visible signs of lightning damage, takes a thorough understanding of the receiver system operation to determine rationality between the extent of damage and probability that it could have been caused by lightning. Often to determine the extent of damage requires further testing. Most servicemen will recommend replacement simply because their companies are not capable of performing repairs to the system PC boards. If they farm the work out to another shop their profit margins will be much smaller than if they replaced the equipment with new. Most lightning damaged equipment can be repaired. Repair may or may not be the most economical or practical solution and again experience with damaged systems and the capability to test the equipment to the extent that a rational determination of the probability of success of the repair is crucial. If the determination of replacement is substantiated then the damaged equipment must be reviewed against what is currently offered for sale to ensure the replacement equipment does not warrant an unnecessary upgrade.

As you might expect, FORCON can help you make these determinations. Call us if you need help with any of these claims.

Stan Lamberski - FORCON Consultant

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If you have any change of address,  
please mail corrections to:

**Forcon International Corporation**  
**1216 Oakfield Drive**  
**Brandon, FL 33511**

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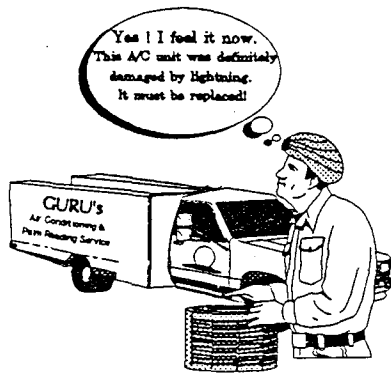
Lightning damage claims on computer systems are almost as new as lightning damage claims on satellite receiver systems. The claims adjuster faces many of the same problems on these claims as in trying to resolve the satellite receiver system claims; verification of the cause of damage; can the damage be repaired economically; is the proposed replacement equipment equivalent to the equipment it is replacing.

To assist our clients on these claims, FORCON provides the following scope of services:

- Obtain a list of all equipment reported damaged.
- Inspect the equipment to validate the equipment list and determine which equipment on the list show visible signs of damage consistent with a loss by lightning.
- For the equipment on the list which does not show any visible sign of damage, determine why the conclusion of lightning damage was made.
- Determine whether the equipment should be tested to verify the damage.
- Determine if any of the damaged equipment is covered by a maintenance agreement and if so, is lightning loss covered.
- Determine what salvage value the supplier will allow.
- Obtain a list and cost of all proposed repair and replacement equipment.
- Determine if any replacement equipment represents an upgrade in function or performance with respect to the damaged equipment. If so, identify an equivalent replacement and determine the cost.
- Develop alternative repair or replacement cost estimates.
- Determine the extent of any other loss associated with this claim including data or media.

Give us a call if you find yourself in need of any of the above listed services

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## RESIDENTIAL AIR CONDITIONING SYSTEMS

You may think the cartoon is a little facetious, but we're beginning to wonder if this doesn't represent the way some air conditioning service people determine what is wrong with an air conditioner. Lightning seems to be the culprit for just about anything that's wrong with the unit.

Here are some examples of what we've found on our examination after the insureds service company has told them the unit was damaged by lightning and should be replaced:

- the unit was low on freon and only needed to be recharged.
- the breaker in the service panel was bad. The unit operated fine when a new breaker was installed.
- an electrical contact had corroded off.
- the signal from the thermostat would not cause the magnetic contactor to close. The contactor could be closed manually and the unit ran fine.
- and how about this one! -
- an accumulation of dead ants in the magnetic contactor prevented it from operating. Once the ants were cleaned out the unit ran fine.

A fairly common cause of compressor failure we find is mechanical burn-out. This is indicated by the refrigerant oil turning black and acidic, which is simple to determine. According to DuPont, the manufacturer of "Freon", "Freon" fluoro-carbons with lubricating oils begin to breakdown via chemical reaction when subjected to temperatures above the normal operating temperatures in a compressor. The decomposition occurs over time and results in the oil breaking down into hydrochloric acid and sludge. A gradual mechanical failure which results in increased friction and heat will produce this result. Lightning will not.

Our experience indicates that it pays to verify the extent of damage and the cause of damage on air conditioner lightning claims.

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## OTHER LIGHTNING RELATED CLAIMS FORCON HAS BEEN INVOLVED IN

- Telephone equipment damage
- Heating system damage
- Electrical breaker and service panel damage
- Transformer damage
- Injury to radio dispatcher attributed to lightning and faulty protective system.
- Security systems
- Electrical transmission lines.
- Underground cable systems.
- Microwave transmission and receptor systems.
- Deep well and submersible pumps.




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Mail Questions or Comments to  
 FORCON INTERNATIONAL CORPORATION  
 1216 Oakfield Drive  
 Brandon, FL 33511

# CONSULTANT PROFILE

## MARTIN A. UMAN, Ph.D.

Dr. Uman has provided extensive expert witness and consulting service relative to lightning properties and protection. He is the author of several books on the subject of lightning and holds numerous patents on lightning detection devices. He has published over 100 articles in reviewed journals, almost all of which are on some aspect of lightning and lightning related phenomena.

Dr. Uman received his bachelors, masters and doctoral degrees from Princeton University where he was a member of Phi Beta Kappa and Sigma Xi. He is currently a fellow member of the American Meteorological Society, and the Institute of Electronic and Electrical Engineers, and the American Geophysical Union, and serves on numerous industry and professional committees and task forces dealing with lightning.

In addition to being Chairman of the Department of Electrical Engineering at a major university, Dr. Uman is also Vice President and Chief Consulting Scientist of Lightning Location and Protection, Inc. and a FORCON consultant.

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FORCON International Offices Providing Forensic Consulting and Technical Services:

Atlanta	(404) 390-0980
Chicago	(708) 590-8347
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