

# TRANSI-TRAP SURGE PROTECTORS

with the field-replaceable  
Arc-Plug™ Cartridge

ALPHA DELTA COMMUNICATIONS INC.



Transi-Trip Surge Protectors are gas surge arresters designed to protect sensitive electronic equipment from damage due to excess voltages or currents generated by transient phenomena (lightning or static build-up).

The elements in the Arc-Plug™ Cartridge consist of two metal electrodes hermetically sealed in a rugged gas filled, ceramic cylinder. They perform as voltage-dependent switches which can reliably and repeatedly carry large currents for brief periods of time. In operation, a sufficient voltage across the element causes an arc to form between the electrodes, changing its impedance from greater than 10,000 megohms to a few milliohms in less than 100 nanoseconds time. While conducting in the arc mode, the voltage across the surge arrester is less than 30 volts.

The life of the Arc-Plug Cartridge is a function of the surge current amplitude and duration to which the device is subjected. Transients are by their very nature unpredictable in magnitude and energy level. Life may be many hundreds of operations, depending on surge current wave shape.

After a sufficient number of lightning pulses have been discharged through the Arc-Plug Cartridge, there is a gradual lowering of breakdown voltage and insulation resistance. Therefore, Arc-Plug Cartridge replacement is indicated by an increase in VSWR during transmitter tune-up, or by a "dead" receiver caused by an extremely strong near-miss lightning discharge shorting the Arc-Plug Cartridge. In this case, the short continues to protect the equipment until cleared.

## IMPORTANT—Read before installing!

### 1. INSTALLATION:

Note: Any model must be placed at a point in the coax line where the VSWR does not exceed 2:1 to prevent high R.F. voltages from triggering the units. When outdoor use is planned, it is necessary to coat thoroughly all surfaces (after attaching coax and ground wire) with a good sealer/protector.

### 2. Ground system:

The unique isolated ground system of Transi-Trip Surge Protectors permits direct earth connection while preventing arc energy from being coupled to the equipment chassis through the coax shields. Lab tests show this method to be

### INSTALLATION INFORMATION

best for overall protection. For the system to work, it is absolutely necessary to attach a direct earth ground wire to the nut and washers on the Arc-Plug Cartridge. (A cold water pipe connection is suitable if its ground path is not too long or circuitous.) The surge protectors will not function without this connection as there is no other return path for the arc energy.

For maximum protection, ground the antenna coax shield to an earth ground at the point of entry to the building. This is important since a closer near-miss can cause a high induced voltage on the shield. Also, attach an earth ground to the chassis of the station equipment. Both of these suggestions follow good engineering practice, regardless of the type of protector in use.

### Test results:

The level of protection provided by Transi-Trip Surge Protectors is remarkable, and our lab tests show outstanding state-of-the-art performance. By using a special wave front generator, simulating fast rise time lightning-type pulses of up to 10 kilovolts, we have observed the performance of Transi-Trip Surge Protectors with semiconductors commonly used in solid state receivers and transceivers. Our own experience in the communications industry has shown that some of the devices most sensitive to lightning-induced surges are certain PIN diodes, including the higher voltage types currently used in the industry. These devices are known to be even more sensitive than many MOSFETs and bipolar transistors in typical use.

By connecting this type of PIN diode directly to the output of the wave front generator, with no protection, the induced pulse will "blow" the diode into a dead short. It should be noted that many PIN diodes fail in equipment when much lower-level surges cause them to become merely "leaky".

### OPERATIONAL AND TEST INFORMATION

When the Transi-Trip Protector is inserted between the generator and the PIN diode, in a typical 50 ohm coaxial configuration, the diodes survive repeated pulses without failure. Other receiver-type components show the same remarkable results.

### Nearby or distant lightning surges:

Since many equipment failures occur as a result of lightning-induced surges from distant storm fronts and near-misses, the operator will find a new dimension of protection with the use of Alpha Delta Transi-Trip Surge Protectors.

Lightning-induced surges (transients) have unpredictable energy content, time duration, and ramp speed (wave front) characteristics. For that reason, these protectors are not guaranteed to protect against direct strokes. Also, certain semiconductors are beyond the protection of these devices. For example, some exotic MOS IC memory devices are so sensitive that the discharge caused by the simple touch of a finger will destroy them.

Arc-Plug™ Cartridge.  
Attach ground wire  
here. (Do not loosen  
bottom nut.)

To remove cartridge,  
unscrew plastic body  
completely until entire  
assembly is free from  
chassis.



R-T, HV

Either connector can be  
used for input or output.

(Low Level Models  
fire at the lowest  
lightning pulse  
level, providing  
maximum  
protection. For  
receivers and  
transceivers

Arc-Plug  
Cartridge.  
Attach ground  
wire here. (Do  
not loosen the  
nut that is  
touching the  
body.)



LT

#### NOTICE FOR INSTALLATION WITH REPEATER / DUPLEXERS:

If the Trans-Trap Protector is placed in the output (antenna) side of a duplexer, it may be necessary to vary the length of the ground-lead to the protector or run the ground-lead through a ferrite bead at the point of attachment to the protector. The value and size of ferrite is not critical. This procedure will help prevent any stray coupled RF in the ground-lead from re-entering the open receiver as "noise".

#### NEW "EMP SERIES"

Models R-T and LT "EMP Series" Arc Plug™ cartridges are designed to protect against nuclear Electromagnetic Pulse (EMP) as well as lightning surge voltages. The EMP pulse clamping level is 3 times lower than the previous designs for maximum safety.

The "EMP Series" design is based on the National Communications Systems Technical Information Bulletin 85-10 covering EMP protection for radio communications equipment.

All Trans-Trap™ protectors feature "isolated ground" to keep damaging ARC energy from the chassis.

FOR FURTHER INFORMATION on NCS TIB 85-10 contact:

Office of the Manager  
National Communications System  
ATTN: NCS-TS  
Washington, D.C. 20305-2010

CAUTION: Each Arc-Plug Cartridge has been selected and screened for correct pulse breakdown and rf characteristics for each model. Replace only with proper Arc-Plug from Alpha Delta Communications.

Alpha Delta Trans-Trap Protection Systems are designed to reduce the hazards of lightning-induced surges. These devices, however, will not prevent fire or damage caused by a direct stroke to an antenna or other structure.

## INSTALLATION INFORMATION

MODELS AVAILABLE: (with UHF connectors)

#### Trans-Trap Models R-T & LT

Low Level Protector- for use with solid state receivers, transceivers or transmitters running up to 200 watts output at 50 ohms.

Model LT to 30 MHz, Model R-T to 500 MHz.

#### Trans-Trap Model HV

High Voltage Protector- for use with amplifiers running up to 2kW output at 50 ohms.

Model HV to 500 MHz

The Models R-T & HV Protector Series are special low loss (typ. 0.1 dB at 500 MHz) models for use with through VHF/UHF.

#### Replacement Arc-Plug Cartridges

For Models R-T & LT and for Model HV

Note: Model R-T is also available with "N" type connectors, as Model R-T/N.



Special shock absorber  
for excellent mechanical shock and  
vibration protection.

#### Warranty

Seller warrants that each unit sold is manufactured in accordance with seller's specifications, drawings, samples or data in effect on the date of receipt of the order, as they apply to those parts called for on the order, and that each unit is free from defects in material and workmanship.

Sellers liability under this warranty is limited to the repair or replacement of any unit which proves to be defective in material or workmanship under normal use and service provided the unit is returned to the Alpha Delta shipping point (or authorized distributor if purchased through this source) within six months from date of shipment, and will in no case be responsible for special or consequential damages including but not by way of limitation, cost or removal of units from our installation in equipment.

This warranty is in lieu of all other warranties expressed or implied.

Specifications, availability and prices are subject to change without notice.

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