AD510-10 Active Transmitter/Receiver Antenna with a 30m or 40m RG213U down-lead and DC regulator for Iridium Telephone Systems

Introduction

Iridium telephones were originally designed to operate with passive antennae, either an element attached directly to the handset, or a remote aerial connected with a short length of coaxial cable. Unfortunately, a signal loss of more than 3dB in a remote antenna's connecting cable degrades performance due to attenuation of both the received and transmitted signals. A 3dB loss corresponds to approximately 10m of RG213U or 3m of RG58U coaxial cable, lengths that clearly restrict the mounting options for the antenna using standard down-leads.

The AD510-10 active Iridium antenna (figures 1&2) is designed for use with 30m (98 feet) or 40m (131 feet) of RG213U coaxial cable terminated with type 'N' connectors. Designed for harsh environments, the AD510-10 consists of two RHCP dipole antennae housed within 4mm thick GRP radomes mounted on a common base. One antenna is for signal transmission and one for reception. A linear power amplifier within the base and connected to the transmitting antenna compensates for signal loss incurred mainly by the connecting cable. Similarly, a low noise amplifier is attached to the receiving antenna via a low loss interdigital filter to boost the signal sent to the telephone. The interdigital filter has a bandwidth of 12 MHz centred on the Iridium band designed to attenuate any out of band interference that may arise, for example from nearby Inmarsat uplinks.

Using manufacturing techniques proven for a range of extremely rugged GPS/DGP active antennae, the antenna base is milled from aluminium and hard anodised, giving an attractive green finish, which is mechanically resilient and resistant to corrosion. The antenna's mass is 2.6kg.

Mounting and Operation

(1) The AD510-10 should be mounted with an unobstructed view of the sky. An aluminium bracket with V-bolts is provided to attach the antenna to horizontal or vertical spars up to 60mm in diameter, figure 2. The bracket is shipped inverted on the end of the AD510-10 antenna and should be detached, turned over, then repositioned either to the centre or end of the antenna case as required using the mounting holes in the base.

(2) The RG213U coaxial down-lead is attached to the N-type connector on the underside of the antenna, figure 2. Wrapping the connectors with self-amalgamating tape is recommended for permanent installations and the cable should be taped or strapped to the spar as appropriate.

(3) **AD510-10 antennae supplied with 40m RG213U down-leads must be used with the accompanying AD510-40 DC supply voltage regulators (figure 3), which accept +9V to +36V dc at 500mA. The down-lead must not be shortened by the user. Similarly, antennae supplied with 30m RG213U down-leads are only to be used with the AD510-30 DC supply voltage regulators provided. Again, the down-lead must not be shortened. In all other respects, however, the assembly and operation of the 30m cable systems are identical to those with 40m cables.**

(4) The AD510-40 (or AD510-30) supply voltage regulator should be positioned close to the telephone base-station or handset. The RG213U down-lead is then attached to the N type connector on the AD510-40 (figures 3 and 4).

(5) Connection between the telephone and the AD510-40 is made with a coaxial cable terminated with TNCs. An adapter is provided with the Iridium handset, which enables a TNC terminated cable to be attached to the telephone. The AD510-40 case has drilled flanges to enable permanent fixing.

(6) A 3m flying lead for the AD510-40 (or AD510-30) supply regulator is provided for connection to the DC supply (+9 to 36Vdc at 500mA), which can be trimmed (or extended) if necessary. The red wire is connected to supply positive, whilst the blue wire is for either an isolated or grounded negative supply. The AD510-40 (or AD510-30) is protected against output short-circuiting by a fuse, which is resettable by disconnecting the unit from the +9 to +36Vdc supply.

(7) With all connections made, the telephone can then be turned on and used as normal- it is transmitting into a load impedance equivalent to a matched passive antenna. The gains of the antenna transmitter and receiver are factory set to compensate for the total attenuation between the telephone and the antenna, mainly determined by the RG213U down-lead. Consequently, the signal output level and frequency from the antenna is equivalent to that radiating from a passive antenna mounted directly on the handset, subject to the antenna transmitter being a linear device. Transmitter linearity is verified with test protocols using an HP 8591 EMC analyser that also ensure there are no spurious out of band emissions.

Figure 1. AD510-10 Active Iridium antenna

Figure 2. AD510-10 active Iridium antenna with mounting bracket and RG213U coaxial down-lead

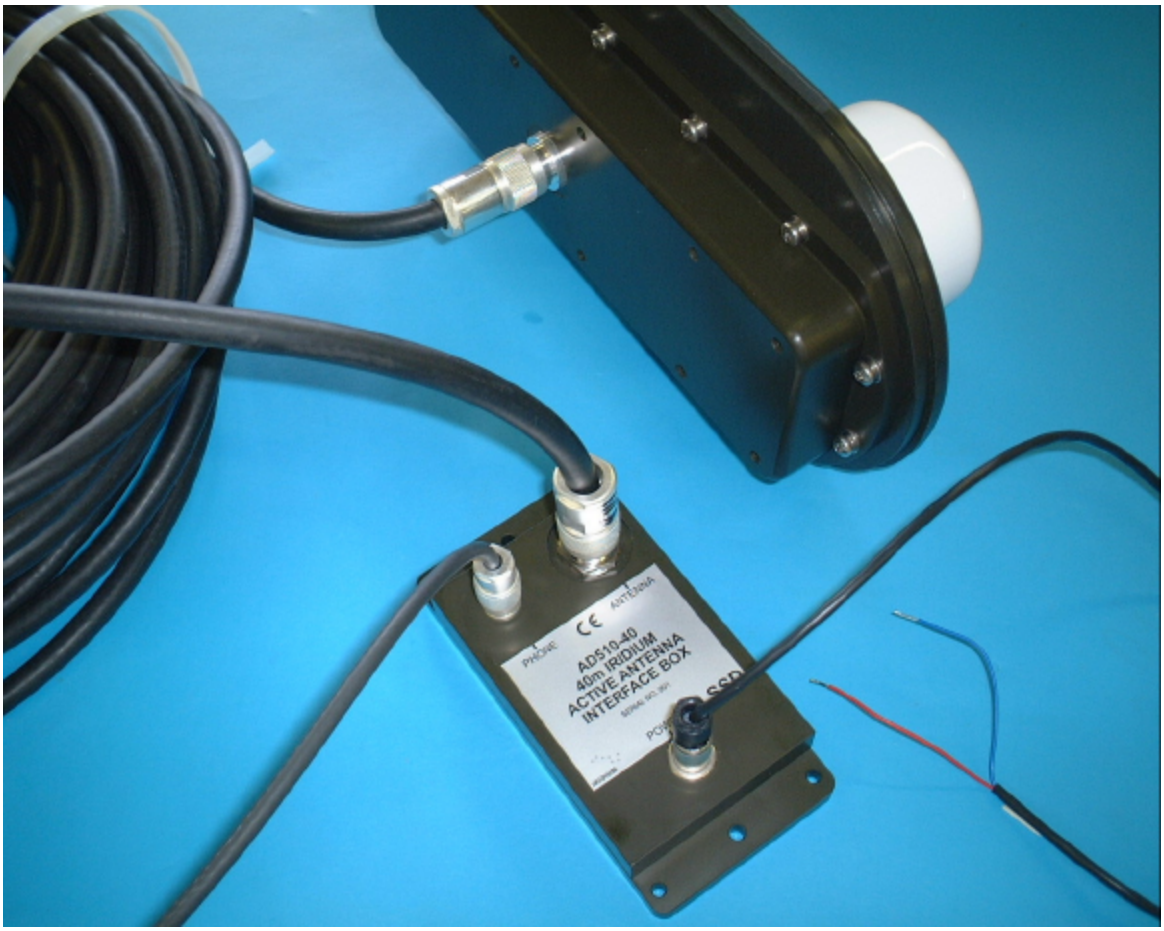

Figure 3. AD510-40 voltage regulator and break-in for use with +9 to 36Vdc supply. The case is hard anodised aluminium and has fixing flanges. A 40m coil of RG213U cable is shown connected to an AD510-10 active antenna (top). The handset interconnect is shown trailing from the TNC to the bottom left, whilst the flying lead for connection to 9 to 36V dc supply is shown cutting the frame to the right.

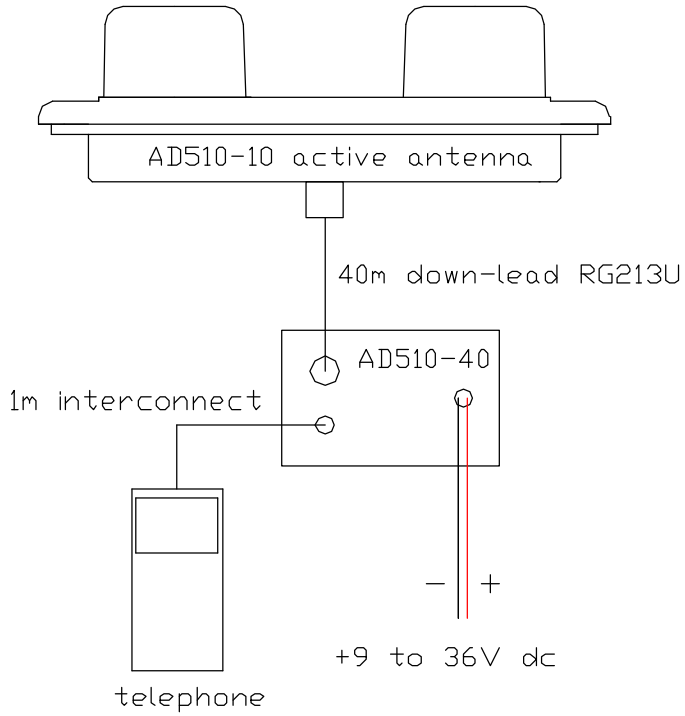

Figure 4. Schematic diagram for system connections

(1) Mount AD510-10 active antenna with clear view of sky using bracket supplied.
(2) Attach top end of 40m (or 30m) down-lead to N type connector on underside of antenna.
(3) Attach bottom end of down-lead to N type connector on voltage supply regulator AD510-40 (or AD510-30). **The down-lead must not be shortened by the user**.
(4) Attach interconnect between TNC on AD510-40 (or AD510-30) and telephone (or base station) using the antenna adapter provided with the phone.
(5) Attach DC supply lead to +9 to +36V DC supply (500mA max). Red lead to +supply, Blue to –supply.
(6) Turn on Iridium telephone and log-in.

END OF INSTRUCTIONS