

SINGLE STATION LOCATION SYSTEM

General

In October 1968, a Single Station Location (SSL) Direction Finding system (Code Name Short Cell) suitable for providing the location of HF sky wave transmissions was delivered to the Troop. Short Cell had been developed by WRE and was different to other SSL systems in that it had been modified to locate transmitters that were relatively close to the receiving system.

SSL Concept of Operations

In layman's terms, the SSL was capable of receiving a signal, obtaining the direction of arrival (LOB), measuring the height of the Ionosphere, calculating the angle of arrival of the signal after being refracted from the ionosphere, computing the information, and then producing a location of the transmitter. A single SSL station was capable of providing a fix, thus negating the requirement of several stations to form a DF baseline.

It was anticipated that the SSL would normally provide a Circular Error of Probability (CEP) of around 10 kilometres.

Ten kilometres was considered too large for an accurate location, but would provide an area where the ARDF aircraft could be tasked for more accuracy. In other words, the SSL would provide the football field and the ARDF the goals.

The following graphics explain the concept of SSL:

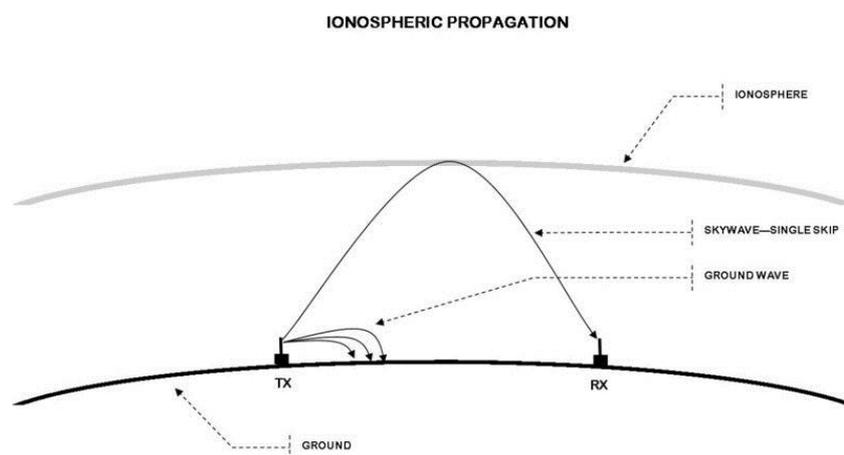


Figure 1: HF Transmission

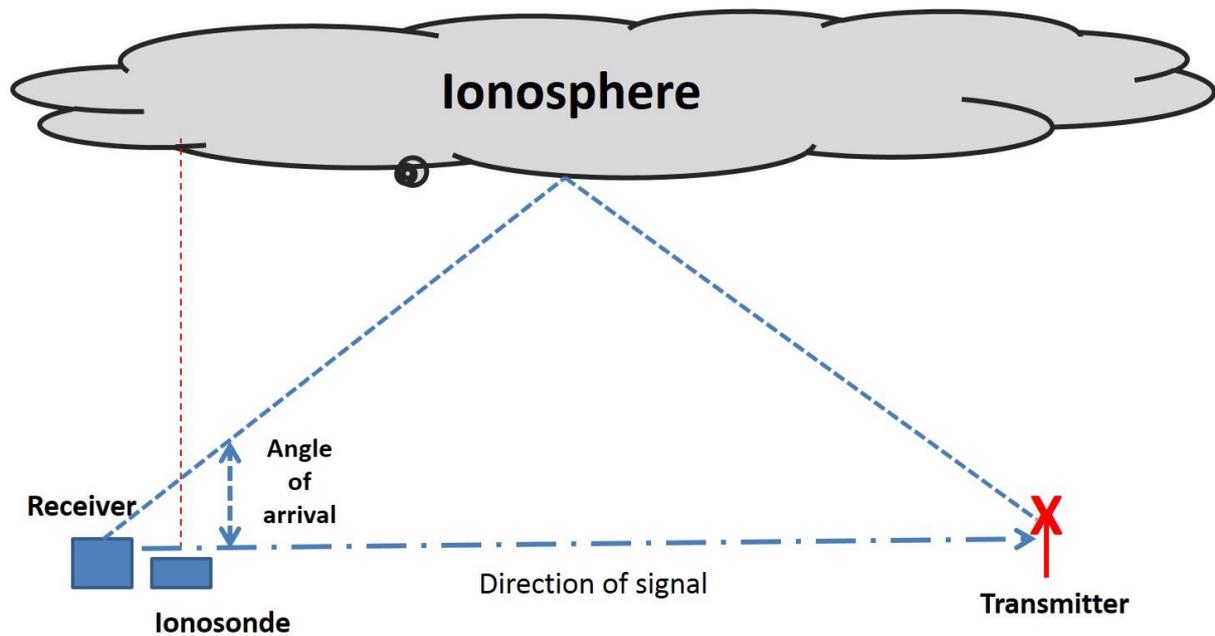


Figure 2: Concept of Operation

Equipment

The main equipment that comprised the SSL station was:

- 2 x Equipment Shelters
- Racal RA-17 Search and DF Receivers
- SSL Control Unit
- Olivetti "Programma 101" Personal Computer (later replaced by the Digital PDP8e)
- Antenna Array
- Ionosonde ¹(In shelter no 2)
- 2 x 15 Kva generators

Full details of the equipment are shown at Annex B

1.

"Fairey Aviation" Ionosonde. The Ionosonde was installed in its own shelter with its dedicated specialist antenna. When the ionosonde fired up, it transmitted a 100Kw signal, pulsed at 50 microsecond intervals and scanned the HF frequency to provide a pictographic representation (remoted to the SSL shelter) of the ionospheric layers (E, F1 and F2) that were capable of refracting HF radio signals back to ground). This equipment was vital in detecting the height of refraction of a task frequency in order to determine the range to the target. As an aside, the operators back in the set room always knew when the ionosonde was fired up as they heard its "chain saw" effect sweeping across the HF spectrum.

SSL Location

After a land clearing operation, the Short Cell was deployed on the western side of Nui Dat hill close to the rubbish dump. Blast walls were erected around the installation for some protection from enemy mortar and rocket attack, and direct small arms fire from outside the Task Force perimeter. The Nui Dat perimeter fence was approximately 200 metres away.



Figure 3: SSL Location

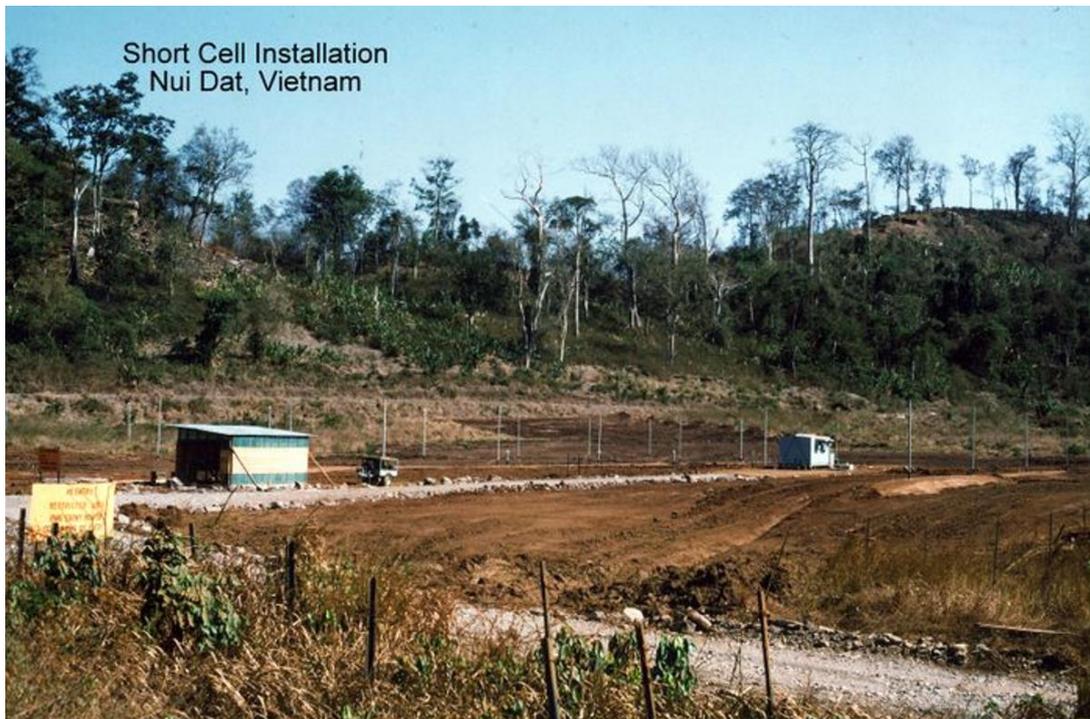


Figure 4: SSL installation. Generator shed on left, equipment shelter on right

Operating Procedure

The normal operating procedure was:

- Start generators.
- Apply power to both shelters.
- Turn on all equipment.
- Check land line communications to the Troop.
- Check the height of the ionosphere by activating the ionosonde.
- When a DF Task was received from the Troop, or a signal was detected during general search, the operator would tune into the required transmission and press various buttons on the control panel.
- The System would then electronically take a LOB, measure the height of the ionosphere as presented by the ionosonde and then calculate the angel of arrival and produce the location of the transmitter with an associated degree of error or CEP.
- The relevant output would be printed out and passed back to the Troop.

Note. Normally the ionosonde would be activated for each target transmission.



Figure 5: Part of the Operators Console

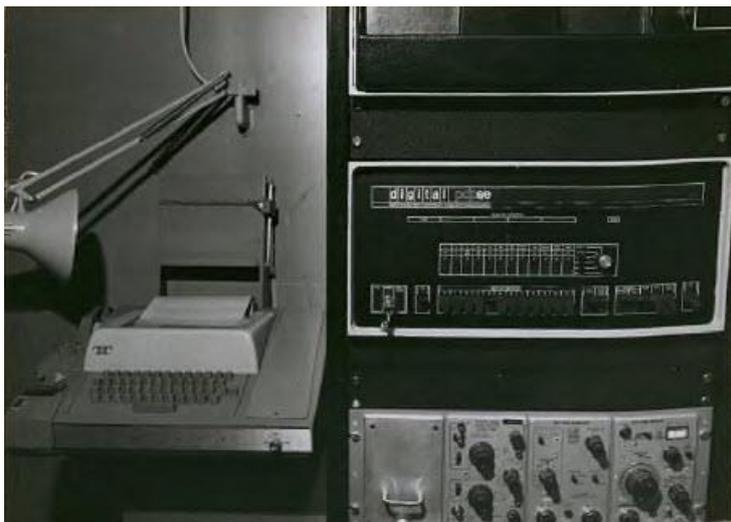


Figure 6: PDP8 Computer and printer



Figure 7: Ionosonde control panel



Figure 8: Ionosonde transmitter and amplifier

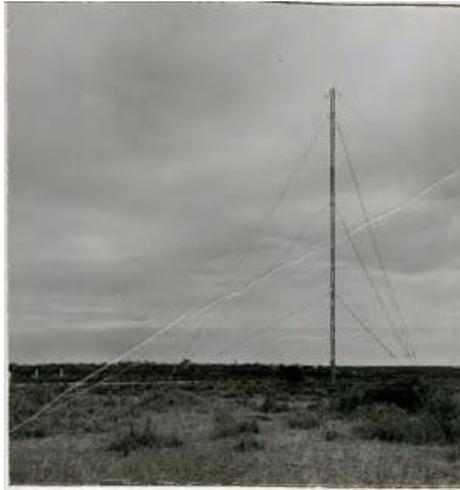


Figure 9: Ionosonde antenna similar to this

The SSL was a great concept and had been used successfully on long haul HF transmissions in the past. Unfortunately being situated so close to the equator, an unstable Sporadic E layer in the ionosphere and the closeness of the VC/NVA targets, the system was not overly successful in SVN. It was more successful in providing accurate LOBs than accurate locations.