

and knowledge of the 'spook' enabled the gathering of intelligence by interception of the communications conducted over these "talking wires". Operatives also learned to use these wires to divert, misdirect and cause confusion among military forces giving and receiving orders of action via these talking wires.

In 1888 the German, Heinrich Hertz, demonstrated that electrical sparks would propagate signals into space at the speed of light. Quickly, scientists in many countries developed technologies that enabled greater distances of communications' capabilities to be achieved. The development of radio by the Italian pioneer Guglielmo Marconi in 1897, accelerated the development of communications and the abilities of those engaged in intelligence gathering to expand their capabilities. The earliest form of electronic warfare evolved from these advancements in Man's abilities to communicate over great distances.

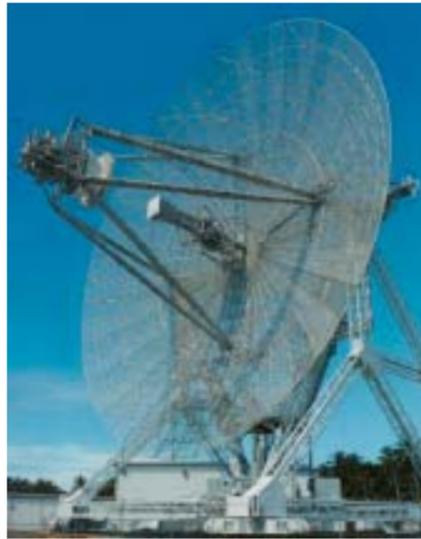
RADIO WARS

The first recorded act of deliberate radio jamming occurred in September 1901, in the United States of America. This act was directed at securing commercial gain rather than military advantage. Perpetrated by the American Wireless Telephone and Telegraph Company (AWT&T), their competitors were Marconi and the Wireless Telegraph Company of America (WTCA). Both Marconi and WTCA had received contracts to broadcast the results of the America's Cup yacht races back to the major newspaper organisations. Marconi's contract was with the Associated Press and WTCA had a contract with the

Publisher's Press Association. The third competitor for the radio reports, AWT&T had failed to obtain a contract. The AWT&T radio engineers used a much higher powered transmitter than the other two companies and successfully jammed their communications attempts while at the same time reporting on the progress of the yacht races. This act was accomplished by employing a very simple code.

RADAR

Much advancement in electronics communications were developed over the next decade and, in World War One, the art of electronic intelligence gathering progressed significantly. Between the wars, there were even more improvements. The British had developed RADAR which enabled them to detect and

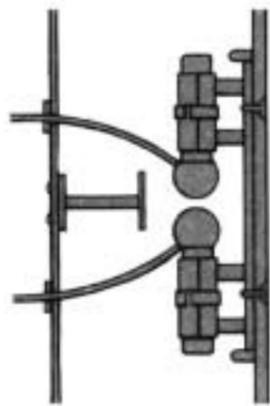


Guglielmo Marconi

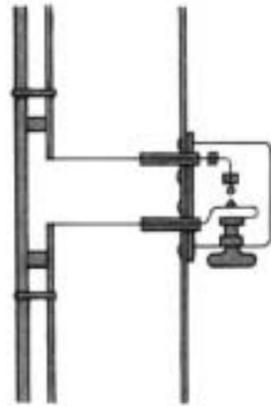
track aircraft and ships. Radio communications now included voice, Morse code, and RTTY (Radio Teletype). Radio communications had also expanded from the lower frequencies to high frequency (HF), on to very high frequencies (VHF) and even into the ultra-high frequency range (UHF). Military aircraft now had radio and a very small number carried radar systems on board. From this evolved the special aircraft configured for intelligence gathering, both electronic and photographic. These achievements also advanced counter-measures' systems. Systems to jam radar were successfully employed. Radar also became a very useful tool for the gathering of intelligence.

During World War II the creation of the first electro-mechanical analog computer was developed by the British in the ENIGMA effort. The British also flew the first aircraft

Heinrich Hertz pictured alongside his oscillator (sender) and resonator (receiver)



SENDER



RECEIVER

Main image US Army RU-8D (Guardrail)



GUARDRAIL

Over 30 years ago, the National Security Agency developed an intelligence gathering system called Guardrail in response to a requirement for a system that could provide real-time tactical intelligence gathering. Basically, Guardrail was a COMINT (Communications Intelligence) collection system that was developed to provide Signals Intelligence (SIGINT) support to theatre-level commands.

PHOTOGRAPHS COURTESY NSA

Electronic intelligence collection aircraft at the NSA's National Vigilance Park display



US Navy EA-3B