RADIO AUSTRALIA - DARWIN

A NEW STATION TO SERVE COUNTRIES IN SOUTH EAST ASIA

A high power high frequency broadcasting station is being constructed on the northernmost tip of Central Australia, on Cox Peninsula, about ten miles across the harbour from the city and port of Darwin. Cox Peninsula was chosen because ample space was available-actually, twelve square miles have been taken over-and then because it is close enough to Darwin to have the use of that city's facilities: for instance, power for the transmitters comes from the Darwin powerhouse and is fed at 66,000 volts through two submarine cables. Furthermore, the Peninsula is Australia's closest point to South-East Asia and it lies in the path of transmissions beamed northwards from Shepparton. The new station is being provided to increase the effectiveness of the present Radio Australia broadcast transmissions to the areas north and north west of Australia.

When completed and comes into full operation towards the middle of 1970, the new station will be the highest powered broadcasting station in Australia and will be of world standard in size and power. The first test transmissions from the station took place in February 1969. Regular evening transmissions to South and South East Asia are now being maintained. Regular transmissions to East Asia and the Philippines are expected to begin early in 1970.

The estimated total cost of the station is about $A-9 million divided almost equally between the radio engineering works and the other engineering works involved in establishing sites, buildings, roads and power supplies for the station. It is the only station in the world, whose staff goes to and from work by launch...across Darwin Harbour.

The high-power station complex is being established on the Cox Peninsula some six miles by sea north-west of Darwin. Two separate stations will be installed - a transmitting station on the north-west tip of the peninsula and a receiving station approximately eight miles east of the transmitting station.

Initially, programme for the Darwin station will be obtained at the new receiving station by reception of Radio Australia programme broadcast from Shepparton. Results to date indicate that there is no significant difference in programme quality between relayed programmes and direct transmission from Shepparton. A microwave system to link Darwin with the south is currently programmed for completion in 1972, and a conventional programme feed will then be available.

The two receiving aerials are vertically polarised log periodic types designed and manufactured by Co-el of Italy for optimum performance on the Darwin-Shepparton path, with high front-to-back ratios to minimise cross-fire from the nearby 250 kw transmitters, as well as interference from existing high-power transmissions in areas north and north-west of Darwin. The outputs of these antennas are fed to four diversity receiving terminals manufactured by Racal Electronics, U.K. The output of the diversity receiving terminals is monitored and selected by an operator for relay to the transmitting station via a microwave radio link manufactured by Radio Corporation of America. This microwave system loops the programme through Darwin to permit the Australian Broadcasting Commission to monitor and insert programme material if necessary.

The transmitting installation will comprise three American-built Collins Model 821A-2 high-frequency transmitters, each capable of delivering a power output of 250 kw. These transmitters represent the latest advances in broadcasting technology and embody extensive solid-state circuitry.

The major points of interest in the transmitter designs are:-

(a) the use of a high-speed digital computer system for transmitter control and checking. Besides providing for normal on-off frequency changing and tuning requirements on the transmitters, the computer control will carry-out all routine testing and logging of transmitter operating conditions at predetermined intervals and will record this data as a permanent record. In the case of a transmitter fault occurring, the computer control will close down the equipment, provide an alarm and accomplish diagnostic investigation, under direction, to isolate the fault.

(b) the power amplifiers and modulator stages of the 250 kw transmitters will utilise vapour-phase-cooled tubes with maximum anode dissipations in the order of 300 kw. The use of vapour-cooled anodes reduces the water flow to only 5 per cent of that required for earlier water-cooled tubes and enables the high heat energies involved in the 250 kw transmitters to be dissipated in a cooling system of acceptable physical dimensions.

(c) the 250 kw transmitters are designed to operate at full carrier power output when the modulating signal (usually speech) is heavily clipped to raise the average depth of modulation and so enhance the intelligibility of the transmissions in the presence of noise at the receiving locations. The distortion resulting from the clipping process is acceptable on speech programmes, and when full clipping (trapezoidal modulation to a depth of 95%) is employed, the intelligibility of the transmission from a 250 kw transmitter equals that of a 550 kw transmitter operating without trapezoidal modulation.

Programme input equipment for the transmitter is being fabricated by Post Office staff in South Australia, with the exception of the Swiss Brown Boveri speech clipping and compressing amplifiers which are necessary for the trapezoidal modulation process.

The three transmitters will be connected to the five antennas via open-wire transmission lines of 500 kw power-handling capability through a Brown Boveri matrix switch enabling any transmitter to be connected to any antenna.

The transmitting antennas are two-bay, vertically polarised log periodic arrays erected above a highly-conductive earth system but with a balanced input impedance to enable direct connection to the balanced transmission line system.

A total of five log periodic arrays will be installed to cater for transmissions to the required target areas on the Asian continent.

The transmitting arrays are designed for 500 kw working to permit parallel operation of two 250 kw transmitters on one transmission should this be required in the future. The design of the antenna provides for maximum received signal levels in the target areas while also providing a high degree of protection on other bearings, particularly rearwards, to minimise cross-fire into the receiving station aerials.

With an average gain of 18 dB available from the transmitting arrays, the effective radiated power using 250 kw transmitter powers will be 23 mega-watts towards the target areas.

By utilising the log periodic type of aerial array, it is possible to cover all transmission requirements from three transmitters with only five arrays and a simple transmission line-switching facility. A 500 kw dissipative line constructed from stainless steel tubing is to be used as a non-radiating test load for the transmitters.