Technical Paper

MTBF / MTTR

Version 2.0

April 2020

## Mean Time Between Failures (MTBF)

4RF Limited has identified a need to establish reliability figures for its Aprisa XE Radio.

4RF has modelled the various components of the Aprisa XE radio according to the Telcordia Model. Relex Reliability Software V7.6 was used as an aid to establish these figures. The Telcordia procedure commonly expresses failure rate in FITs which is an abbreviation for Failure In Time.

One FIT is 1 failure per 1 billion (10^9) hours. The MTBF is simply the inverse of this figure. To convert from FITs to MTBF use the formula:

MTBF (hours) = 10^9 / FITs. (see table 7-11 of SR-332 for further information).

The analysis is performed using Method 1, Case 3. This allows component stresses to be taken into account and results in a lower computed failure rate than the 'parts count' method, because of the conservative component ratings used in the Aprisa XE radio design.

MTBF over Temperature
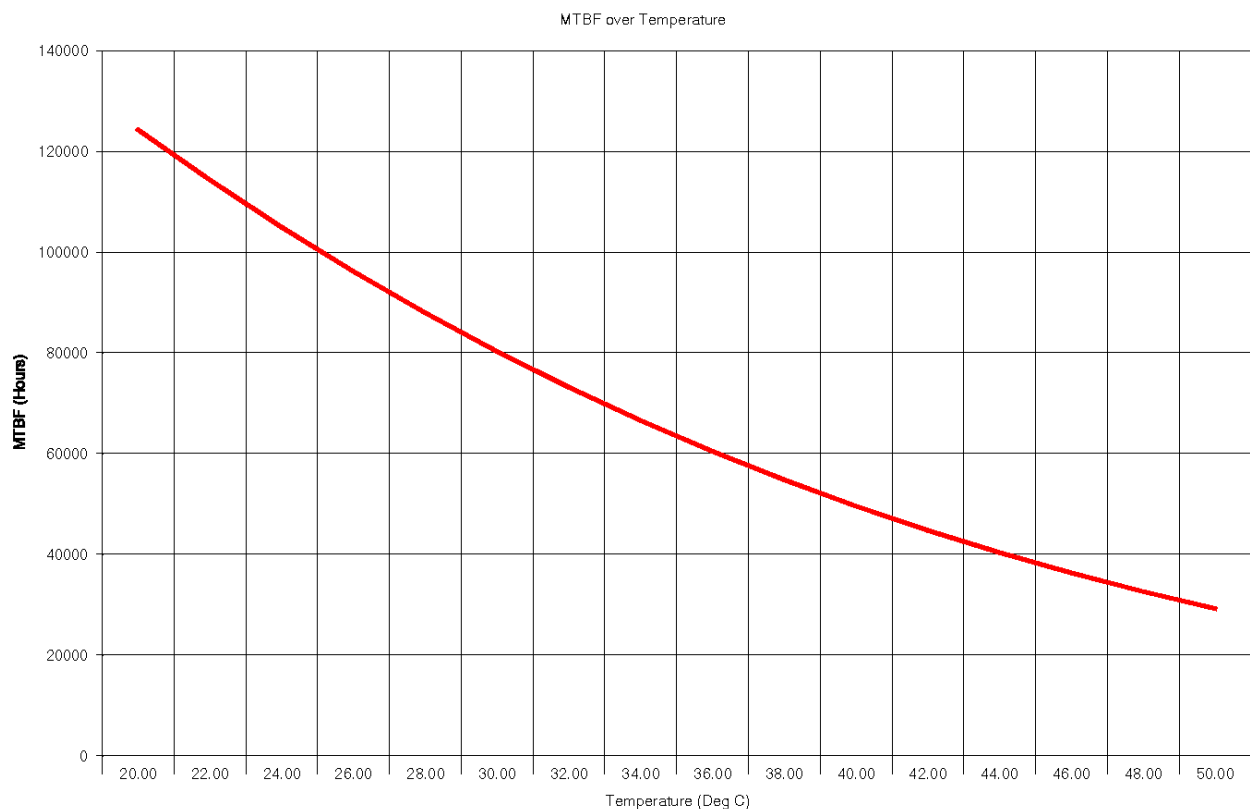
Field Failure Analysis.

4RF Limited constantly records the reported field failure rate versus the number of known active radio links. Based on this information, we can calculate the MTBF based on the known failures and the operational hours.

Calculations based on the calendar year-end average, the MTBF for an Aprisa XE radio is 133 years.

Mean Time To Repair (MTTR)

MTTR refers to the amount of time required to repair a system and restore it to full functionality.

The MTTR clock starts ticking when the repairs start, and it continues until operations are restored. This includes repair time, testing period, and return to the normal operating condition.

MTTR depends entirely on the spares to hand.

With a full set of spares, the MTTR for Aprisa XE radio is <15 minutes.

The Aprisa XE has a comprehensive fault and alarm system that allows for instantaneous reporting of failures that allows repairs to be undertaken.