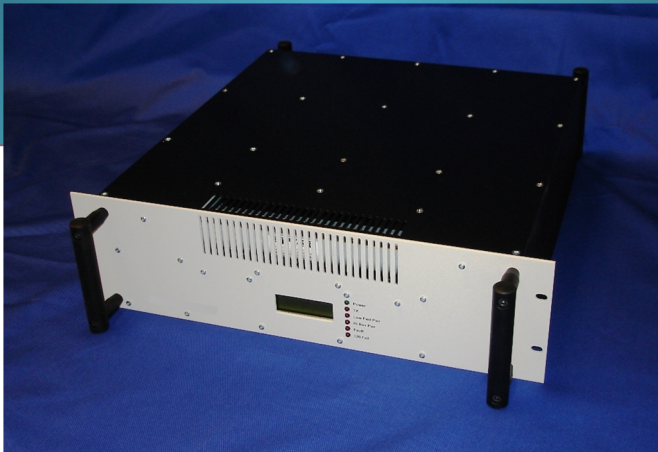


Radio Systems Customisation and Bespoke Development



- ◆ Innovative customisation of Keynet technology
- ◆ Bespoke solutions breathing new life into ageing systems



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Product Customisation and Bespoke Development

1. Introduction

Radio Systems designs and manufactures the Key branded range of radio communications equipment. Briefly, all design and prototyping is carried out in the UK and in common with many manufacturers, production facilities are in the Far East. Both UK and Far East operations are certified to ISO9000 by NQA.

The strength of any organisation lies primarily in its personnel. The design team has operated as a cohesive unit for over ten years and its reputation for quality, innovation and versatility has lead to approaches for not only customisation of the in house Key product range but also bespoke development.

Bespoke development of both hardware and software can be roughly divided into two categories, stand alone units or units to operate within existing systems.

This brochure will include case studies of Key product customisation and for most, the specific skill sets required are the ability to analyse, understand and comply with the interface requirements of other manufacturers' equipment and systems.

This unique set of skills, developed over the years has been called upon on numerous occasions and the products developed have formed seamless additions to existing systems that have either enhanced functionality or extended their useful life, thus avoiding expensive complete system replacements.

Case studies are included that will illustrate the services that Radio Systems is able to offer in this respect.

2. Key Product Customisation

Separate brochures are dedicated to providing more comprehensive details of the Key product range. For the purposes here, it will suffice to say the wide area infrastructure, that is equipment to be found at transmitter sites and control rooms, is known as Keynet and the primary voice and data mobile terminal is the KM4000.

Rather than a large range of products, each with its own dedicated functionality, Key equipment design philosophy has always been to limit the hardware building blocks by making the core products feature rich, versatile and importantly with sufficient spare internal processing power to support customised software interfaces.

Whilst the Keynet 2 and KM4000 brochures give details of case studies and applications of Keynet technology, it can be noted here that the approach has elevated Keynet to the system of choice where a dedicated packet data bearer is specified over a wide area between elements of third party systems.

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Briefly, examples are below.

- Keynet technology pioneered the use of the MPT1327 Standard as a voice and data bearer for Real Time Passenger Information Systems
- Keynet technology pioneered the use of the MPT1327 Standard as the data bearer for Telecontrol in the Electricity Distribution Industry
- Keynet technology supports the largest Private Hire fleet in Europe with voice and real time vehicle tracking.
- The KM4000 provides simultaneous functionality for voice, data, asset tracking, location and vehicle movement based alarms, telemetry and non volatile event recording both in and out of infrastructure coverage.

3. Bespoke Development

Bespoke Development is not addressed in other marketing literature and is therefore dealt with more comprehensively here. Having outlined the design principles above, the diversity of services that Radio Systems can offer in this respect are perhaps best considered against case studies.

3.1 National Rail Network (NRN) Base Stations

The ageing NRN radio system is a UK nationwide trackside pre-standardisation MPT1327 infrastructure, supporting rail operations. The infrastructure includes a base station transceiver the Storno CQF9774-7696/00, a Transponder Storno CQF9774-7696/01 and a receive only unit Storno CQF9N74-7696/00, all of which are obsolete.

Although the ultimate intention has always been to replace NRN with GSM-R, delays in the new system deployment left a question mark over spares stock levels of Storno equipment and the extended operation of NRN.

The Key product design team was approached to conduct a feasibility study into the design and provision of replacements for the three CQF9000 variants but with a much specialised mechanical specification.

Redundant CQF9000 equipment was to be stripped of all internal circuitry, the cases were to be reworked to accommodate new transceiver plus control modules and the existing multiway connector was to be retained.

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Being a pre-standardisation MPT1327, software challenges included the facts that not all MPT 1327 features are included and more importantly, additional non-standard telegrams have been implemented. Timing of Air Interface signalling also differs slightly from modern implementations.

The project was undertaken and with new Key derived modules backed by in house R&TTE certification, the three variants supplied have a revised life of at least ten years of service, support and spare parts availability.



Fig.1 Storno CQF9000, Case Remilled, New Key Modules in Place, Screening Removed

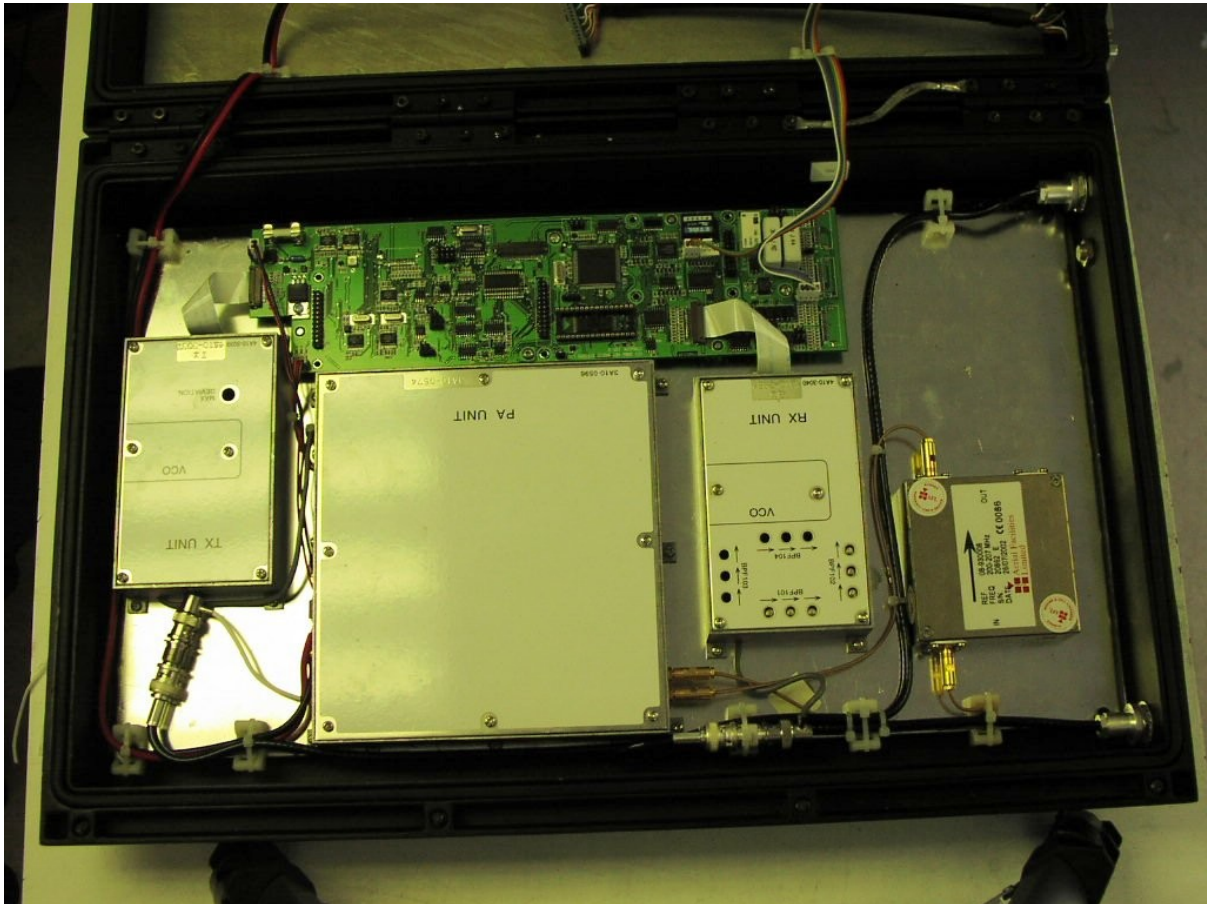


Fig.2 Storno CQF900, Case Remilled, New Key Modules in Place, Screening Fitted

3.2 Paging Transmitter

The design team was approached by the supplier of the largest paging network in the UK, with a specific problem.

The paging transmitter that was widely deployed was to become obsolete. To minimise cost and site works, the specification was for a replacement unit of the same size, same transmit power of a hundred Watts and the same POCSAG performance when interfaced to the existing paging controllers, which were to be retained.

After going through well disciplined order intake processes, a definitive specification within an acceptable commercial framework was agreed.

Hardware design was comprehensive, involving metal chassis production, new Power Amplifier and heatsink castings.

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Software design involved a mimic of the old transmitter performance using the existing controller command and response structure plus a mimic of modulation characteristics.

Following prototyping and formal testing regimes, seventy have now been produced and are in successful service as part of a continuing upgrade programme.

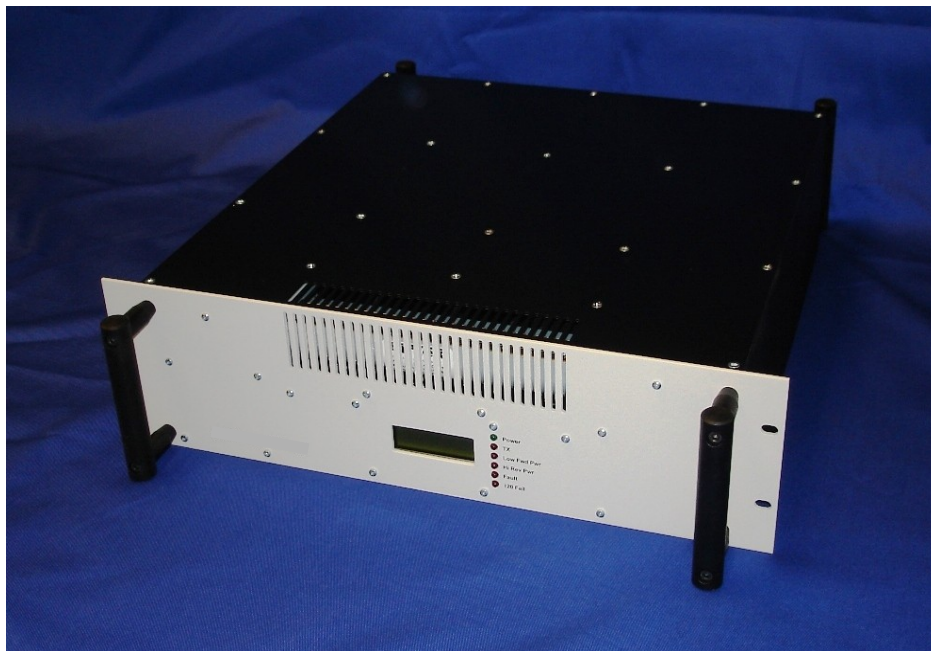


Fig.3 Key 100 Watt POCSAG Paging Transmitter, Front View



Fig.4 Key 100Watt POCSAG Paging Transmitter, Rear View Showing Heatsink Casting

4. Hybrid of Key Product Customisation and Bespoke Development

On some occasions projects demand a bespoke development that also includes customised Key branded products. This is perhaps best illustrated with a further case study.

4.1 Wireless Public Address for the UK Nuclear Power Industry

Some of the older electricity power stations in the UK have entered decommissioning phases. Since this involves a programme of progressive demolition of site buildings, it presents a unique set of technical challenges.

One of the operational and Health & Safety requirements is a functional site wide Public Address system. With an ongoing programme of demolition and ground works, a wired system was neither practicable nor sustainable.

A section of buildings with a longer planned life were equipped with a wired system but it fell to a customisation of Keynet technology to provide the remaining solution.

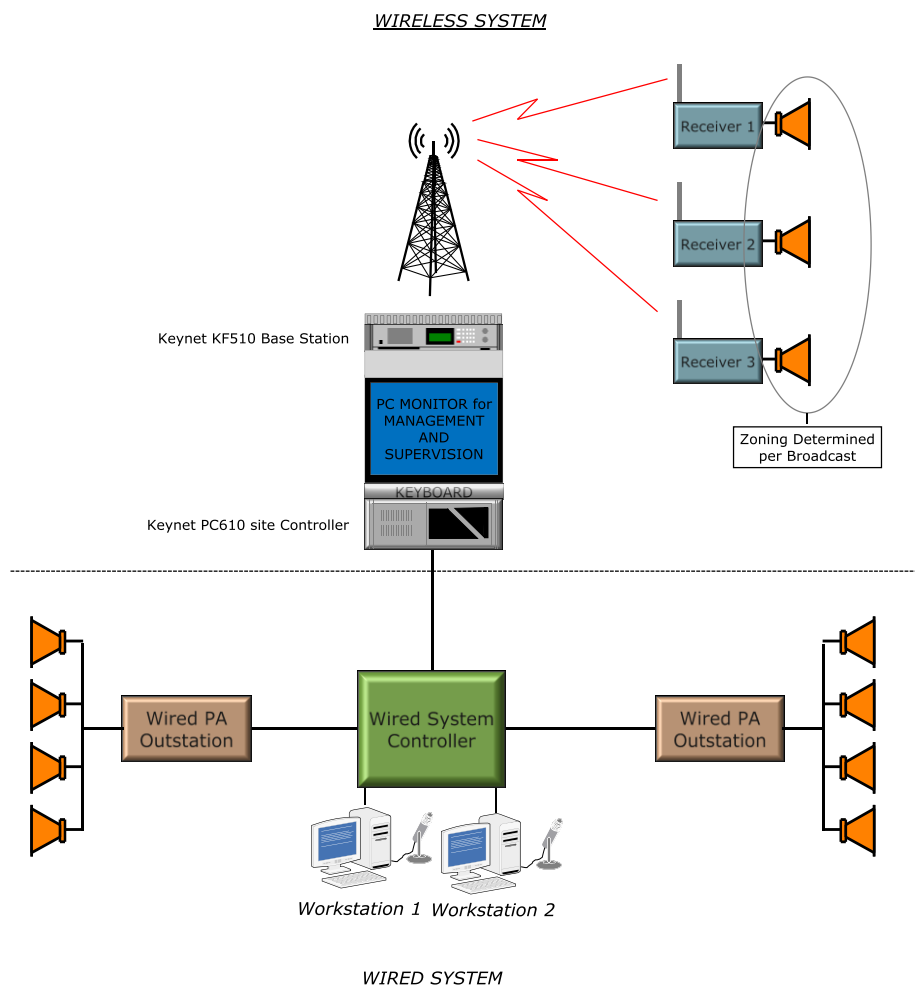


Fig.5 Wired and Wireless Public Address Using Keynet Technology

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Briefly, a power station site is provided with radio coverage from a single Keynet transmitter site. In order to maintain control of broadcasts from the wired system, the Keynet team developed a common interface protocol, whereby the wired system could command Keynet and Keynet could feed back system status data to the wired system.

The Keynet team developed the remote wireless public address outstations in their entirety, as a bespoke development project.

Again briefly, each outstation is self contained in an IP65 enclosure, mains powered or battery back up powered for up to thirty six hours. Each has its own radio transceiver, PA amplifier, horn speakers and alarm reporting circuitry. This design philosophy complied with the operational specification, in that units had to be portable for relocating around the site as buildings were cleared and also they had to be continuously monitored.



Fig.6 Wireless PA Outstation, Cover Removed for Bench Testing

5. Quality and Process Control

Quality procedures and process control rank only second in importance to the personnel involved in any given project.

In addition to ISO9000 certification, such is the diversity of the projects undertaken by Radio Systems that the order intake and project management processes embody a degree of flexibility that enables slight project specific adjustments.

An example is that the processes for bidding a tender will be different to the consultative sales approach for bespoke development. Any process adjustments are planned quickly at the commencement of a project and made clear to the Client.

The well practiced process in all cases is the waterfall approach, with each stage of the process having Radio Systems internal and Client inclusive checks and balances, whilst flowing readily into the next stages. A generic flow chart is given on the next page as an illustration that might be applied to a bespoke development project.

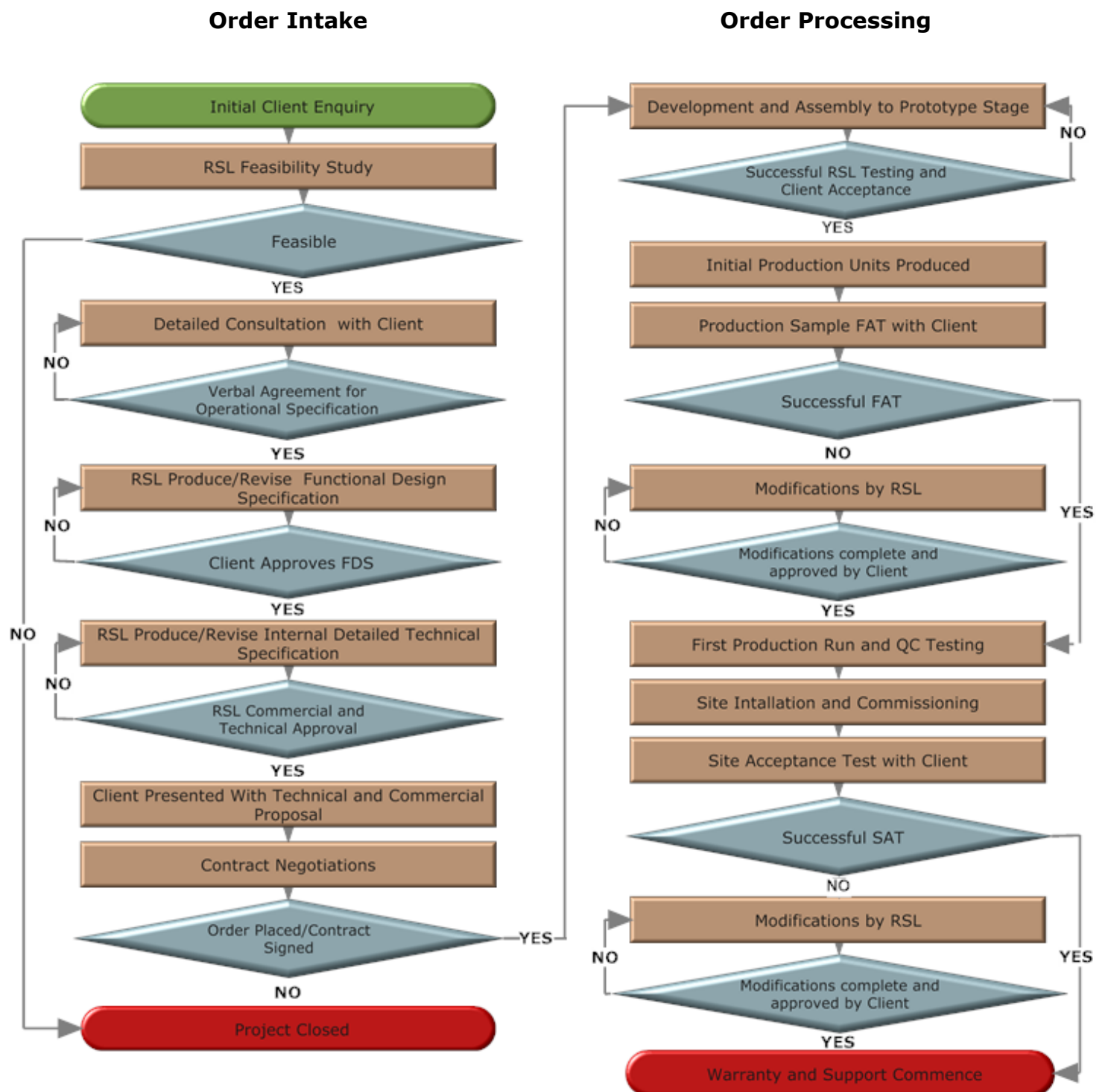


Fig.7 Typical Order Intake and Processing Flow Chart

6. Radio Systems Services

The success and effectiveness of any project is reliant upon a whole range of skills and no matter how good the building blocks of a system might be, without those essential skills, projects can still fail to deliver.

The Radio Systems team is qualified, experienced and moreover understands all the critical steps necessary for a first class delivery.

- Requirements capture and documentation
- Site surveys and propagation studies
- Feasibility studies
- Project Management and Budget Control
- Risk analysis and mitigation
- Preferred component procurement
- In house software and hardware development
- Component manufacturing facilities in ISO9000 environments
- Quality Management and Control
- Factory assembly of systems
- Originating and implementing Factory Acceptance Test Documentation
- Production of Method Statements and Risk Assessments
- Site preparation, installation and commissioning
- Originating and implementing Site Acceptance Test Documentation
- As Built document pack production
- Escrow Agreements
- Warranty
- Maintenance and Support contracts

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7. Radio Systems Certification

Radio Systems adheres to all current UK and EU legislation, has been certified by NQA and is regularly audited for continued compliance.



ISO9001 Quality Certification



OHSAS18001 Health and Safety Certification



ISO14001 Environmental Certification



Compliant with Waste Electrical and Electronic Equipment Regulations 2006

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8. Contacts

The Radio Systems team is always ready to adopt a no obligation consultative sale approach.

For initial discussions, contact details are as below.

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