

ANNEX E-ACQ

CANADIAN ARMY

MEDIUM RANGE RADAR (MRR)

LIST OF ACRONYMS AND DEFINITIONS

1.0 General

The acronyms and definitions listed below are applicable to the MRR RFP documents, specifically, Annex A1 (System Performance Specification), Annex A (Statement of Work - Acquisition), and Annex B (Statement of Work – In Services Support).

2.0 Acronym

| | |
|-------|--|
| 24/7 | 24 hours per day, 7 days per week |
| Ao | Operational Availability |
| AC | Alternating Current |
| ADP | Automated Data Processing |
| Ah | Ampere-hour |
| ALD | Administrative and Logistics Delay, where $ALD = 0.1(TPM + TCM)$ |
| ARTY | Artillery |
| ATC | Area Training Center |
| AWLS | Acoustic Weapon Locating System |
| BAIO | Brigade Artillery Intelligence Officer |
| BIT | Built In Test |
| BITE | Built In Test Equipment |
| C | Celsius |
| C2 | Command and Control |
| C4 | Command, Control, Communications and Computers |
| CA | Contracting Authority |
| CAF | Canadian Armed Forces |
| CANUS | Canada / US |
| CARC | Chemical Agent Resistant Coating |
| CB | Counter Bombardment |
| CDR | Critical Design Review |
| CDRL | Contract Data Requirements List |

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|--------|--|
| CEP | Circular Error Probable (50%) |
| CFFZ | Call For Fire Zone |
| CFSS | Canadian Forces Supply System |
| CFZ | Critical Friendly Zone |
| CG | Centre of Gravity |
| CIB | Controlled Image Base |
| CL | Command Link |
| CLS | Contractor Logistics Support |
| CM | Configuration Management |
| CNR | Combat Net Radio |
| COE | Common Operating Environment |
| COMMS | Communications |
| CONOPS | Concept of Operations |
| COTS | Commercial Off The Shelf |
| CP | Command Post |
| CSE | Common Systems Environment |
| CTC | Combat Training Center |
| DC | Direct Current |
| DET | Detachment |
| dB | decibel |
| DGLEPM | Director General Land Equipment Program Management |
| DND | Department of National Defence |
| DPU | Data Processing Unit |
| DTED | Digital Terrain Elevation Data |
| DVD | Digital Video Disk |
| E3 | Electromagnetic Environmental Effects |

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| EC | Electronic Combat |
| ECCM | Electronic Counter-Counter Measures |
| ECM | Electronic Counter Measures |
| EID | Enterprise identifier |
| EMC | Electromagnetic Compatibility |
| EMCON | Emission Control |
| EME | Electromagnetic Environment |
| EMI | Electromagnetic Interference |
| EMP | Electromagnetic Pulse |
| EMSEC | Emission Security |
| ENGR | Engineers |
| EPA | Effective Project Approval |
| EPM | Electronic Protection Measures |
| ESD | Electrostatic Discharge |
| EW | Electronic Warfare |
| FM | Frequency Modulation |
| FOC | Final Operating Capability |
| FSR | Field Support Representative |
| G | Guns |
| G/H | Gun Howitzer |
| GFE | Government Furnished Equipment |
| GIC | Garbarit International de Chargement (International Loading Gauge) |
| GHz | Giga Hertz |
| GPS | Global Positioning System |
| GPTE | General Purpose Test Equipment |
| GSM | Government Supplied Materiel |

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|-------|---|
| GVW | Gross Vehicle Weight |
| H | Howitzer |
| HB | Hostile Battery |
| HF | High Frequency |
| HLVW | Heavy Lift Vehicle Wheeled |
| HQ | Headquarters |
| Hz | Hertz |
| IAW | In Accordance With |
| ICAO | International Civil Aviation Organization |
| ICD | Interface Control Document |
| IED | Improvised Explosive Device |
| IETM | Interactive Electronic Technical Manual |
| IFCC | Indirect Fire Control Computer |
| IFCCS | Indirect Fire Computer Control Software |
| IMI | Inter-Modulation Interference |
| ILS | Integrated Logistics Support |
| IMINT | Imagery Intelligence |
| INS | Inertial Navigation System |
| INT | Intelligence |
| IOC | Initial Operational Capability |
| IP | Internet Protocol |
| IR | Infrared |
| IRR | Infrared Reflective |
| ISTAR | Intelligence, Surveillance, Target Acquisition and Reconnaissance |
| KE | Kinetic Energy |
| kg | kilogram |

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|-------|--|
| km | kilometre |
| km/hr | kilometres per hour |
| kHz | kilo Hertz |
| kph | kilometre per hour |
| LAV | Light Armoured Vehicle |
| LCC | Life Cycle Costs |
| LCMM | Life Cycle Material Manager |
| LCSS | Land Command Support System |
| LEMS | Land Equipment Management System |
| LF | Land Force |
| LFC | Land Force Command |
| LIFD | Light Indirect Fire Digitization |
| LMS | Land Maintenance System (This is replaced by LEMS) |
| LP | Listening Post |
| LOG | Logistic |
| LOS | Line-of-Sight |
| LRU | Line Replaceable Unit |
| LSA | Logistic Support Analysis |
| LSAR | Logistic Support Analysis Record |
| m | meter |
| m/s | meters per second |
| M | Mortars |
| mA | milliamp |
| MB | mega bytes |
| MCN | Materiel Change Notice |
| MET | Meteorological |

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|---------|---|
| MGRS | Military Grid Reference System |
| MHz | Mega Hertz |
| MIL-STD | Military Standard |
| MKBMF | Mean Kilometres Between Mission Failure |
| mm | millimetre |
| mm/hr | millimetres per hour |
| MMF | Mobile Maintenance Facility |
| MMI | Man Machine Interface |
| MOTS | Military Off The Shelf |
| MRR | Medium Range Radar |
| MRT | Mobile Repair Team |
| MSN | Mission |
| MSVS | Medium Support Vehicle System |
| MTBFC | Mean Time Between Critical Failure |
| MTBF | Mean Time Between Failure |
| MTTR | Mean Time To Repair |
| N/A | Not Applicable |
| NATO | North Atlantic Treaty Organization |
| NBC | Nuclear Biological Chemical |
| NCO | Non-Commissioned Officer |
| NDI | Non-Developmental Item |
| NM | Nautical Miles |
| NRC | National Research Council |
| OJT | On the Job Training |
| Ops | Operations |
| OT | Operational Time |

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| OWSM | Optimized Weapon System Management |
| para | paragraph |
| PCBs | Polychlorinated Biphenyls |
| PD | Project Director |
| PDR | Preliminary Design Review |
| PM | Project Manager |
| PMP | Project Management Plan |
| PO | Performance Objective |
| PRM | Progress Review Meeting |
| QAP | Quality Assurance Plan |
| QC | Quebec |
| R&O | Repair and Overhaul |
| RADHAZ | Radiation Hazard |
| RAM-D | Reliability, Availability, Maintainability, Durability |
| RCS | RADAR Cross-Section |
| RDF | Radio Direction Finding |
| RECCE | Reconnaissance |
| RF | Radio Frequency |
| RFP | Request For Proposal |
| Rh | Relative Humidity |
| RL | Rocket Launcher |
| RMS | Root Mean Square |
| RPG | Rocket Propelled Grenade |
| RSPL | Recommended Spare Parts List |
| RTML | Recommended Training Materials List |
| SCAT | Shelling Connection Activity Trace |

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| SME | Subject Matter Expert |
| SOR | Statement of Operational Requirement |
| SOW | Statement of Work |
| SP | Self Propelled |
| SPTE | Special Purpose Test Equipment |
| SRR | Short Range Radar |
| SRS | Software Requirements Specification |
| ST | Standby Time |
| STA | Surveillance and Target Acquisition |
| STANAG | Standardization Agreement (NATO) |
| STP | Software Test Plan |
| STR | Software Test Report |
| STTE | Special Tools and Test Equipment |
| SURV | Surveillance |
| SVY | Survey |
| SWA | Single Weapon Accuracy |
| TA | Technical Authority |
| TAC | Technical Acceptance Certificate |
| TBD | To Be Determined |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TCM | Total Corrective Maintenance Time |
| TCP | Troop Command Post |
| TIES | Technical Investigation and Engineering Services |
| TMP | Training Master Plan |
| TPM | Total Preventative Maintenance Time |
| TREE | Transient Radiation Effects on Electronics |

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| TSM | Troop Sergeant Major |
| TTP | Tactics, Techniques and Procedures |
| TWG | Training Working Group |
| TWT | Traveling Wave Tube |
| UID | Unique identification |
| USB | Universal Serial Bus |
| UTM | Universal Transverse Mercator (Projection) |
| UV | Ultra Violet |
| V | Volt |
| V/m | Volts per meter |
| VDC | Volt Direct Current |
| W | Watt |
| WES | Weapons Effects Simulator |
| WGS 84 | World Geodetic System 1984 |
| WHMIS | Workplace Hazardous Materials Information System |
| WLR | Weapon Locating Radar |
| WLS | Weapon Locating Sensors |
| WPN | Weapon |

3.0 Definitions

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| All Weather Conditions for Radar Emissions | All weather conditions includes any combination of rain, snow or any other type of precipitation fog, humidity, wind, temperature extremes and altitude, blowing sand and dust. |
| Aspect Angle | The Aspect Angle is the angle between the muzzle azimuth of the weapon and the azimuth of the radar from the weapon site. The aspect angle is measured in degrees. |

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| Availability | <p>Availability combines reliability and maintainability characteristics into a single measure of effectiveness. It is defined as the degree to which the subject system will be in an operable and committable state at the start of a mission when a mission is called for at some random point in time. It is defined as $A = MTBF / (MTBF + MTTR)$, where $MTBF = \text{Mean Time Before Failure} = 1/\lambda$, $MTTR = \text{Mean Time To Repair}$.</p> |
| Base Bleed | <p>Base bleed is a system used on some artillery shells to increase their range, typically by about 30%.</p> <p>Most of the drag on an artillery shell comes from the nose of the shell, as it pushes the air out of its way at supersonic speeds. Shaping the shell properly can reduce this greatly. However, another powerful source of drag is the vacuum left behind the shell due to its blunt base. This drag is difficult to remove, because the shell needs to be "nose heavy" in order to have proper ballistics, and it cannot easily be shaped into a more aerodynamic form.</p> <p>Base bleed is one way to reduce this drag without extending the base of the shell. Instead, a small ring of metal extends just past the base, and the area in the rear of the shell is filled with a small gas generator. The gas generator provides little net thrust, but simply fills the area behind the shell with pressure, dramatically reducing the drag due to the vacuum. The only downsides are a small loss of accuracy due to the somewhat more turbulent airflow, and a small loss in explosive payload due to some of the shell being taken up by the engine.</p> <p>Since base bleed extends the range by a percentage, it is only really useful on longer range artillery. Until recently the loss in explosive was not considered worthwhile for the small gains in range. However, the introduction of much longer range systems based on the GC-45 howitzer has changed the equation somewhat, as 30% extra range on these systems represents 5 to 10 km. Base bleed shells are starting to become more common in units equipped with modern artillery of this type.</p> |
| Chaff | <p>Chaff is a radar countermeasure in which aircraft or other targets spread a cloud of small, thin pieces of aluminum, metal-coated glass fiber or plastic, which either appears as a cluster of secondary targets on radar screens or swamps the screen with multiple returns. Modern armed forces use chaff (in naval applications, for instance, using short-range SRBOC rockets) to distract radar-guided missiles from their targets. Most military aircraft and warships have chaff dispensing systems for self-defense. An intercontinental ballistic missile may release in its midcourse phase several independent warheads, a large number of decoys, and chaff. Chaff can also be used to signal distress by an aircraft when communications are not functional. This has the same effect as an SOS, and can be picked up on radar. It is done by dropping chaff every 2 minutes</p> |

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| Circular Error Probable (CEP) | <p>In the military science of ballistics, Circular Error Probable is a simple measure of a weapon system's precision.</p> <p>The impact of munitions near the target tends to be normally distributed around the aim point, with most reasonably close, progressively fewer and fewer farther away, and very few indeed at long distance.</p> <p>A mathematician might characterize this pattern by its standard deviation, but a more intuitive method is to state the radius of a circle within which 50% of rounds will land. That radius is the circular error probable, abbreviated to CEP (50).</p> <p>For most weapons, the CEP increases with range, so it should either be stated for a particular range, or as an angle.</p> <p>In the case of munitions, which strike at a shallow angle to the Earth's surface, the pattern will become elongated into an ellipse. This can be thought of as the ellipse formed by the plane of the Earth's surface intersecting a cone of error. In this case, the CEP is given as what it would be if the rounds impacted the surface vertically.</p> <p>It should be noted that the concept of CEP is only strictly meaningful if misses are roughly normally distributed. This is generally not true for precision-guided munitions.</p> <p>In the case of a weapon locating system, CEP is a measure of the accuracy of the locations computed by the weapon locating system. CEP (50) is the radius of the circle around the actual weapon location in which 50% of the locations computed by the weapon locating system will be found.</p> |
| Corrective Maintenance Time | Corrective Maintenance Time is that part of the maintenance time including that due to logistic delays , during which corrective maintenance is performed on an item. |
| Electronic Counter Measures (ECM) | ECM are deliberate electromagnetic emissions that are meant to negatively affect the use of the electromagnetic spectrum. |
| False Tracks | A false track with respect to air surveillance is defined as a track being drawn between plots where there is no target actually present. Spurious detections drawn as plot points when there is no target present shall not be considered as a false track. False tracks do not persist on the display. |
| Good Conditions for Radar Emissions | Good conditions includes all detectable object returns except those from helicopters, aircraft, vehicles, rain and caused by ECM and caused by winds over 56 km/hr. |

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| Ground Track | The ground track refers to the projection of the air track on to the surface of the earth where the position shown on the earth is directly below the actual position of the projectile. A "ground track" for an air target is generally defined as the projection of the "air track" on to the surface of the earth as opposed to a Plan Position Indicator (PPI) type display which displays the azimuth and slant range of a given air track. |
| “Hooked” | A hook in air surveillance is a common term to refer to the line that links the data block to the icon of the aircraft shown on the display. |
| Jam Strobe Function | The Jam Strobe function gives the ability to detect, locate and report sources of active RF interference in the environment. |
| Location Error (2D) | <p>Location Error is the two dimensional location error is the flat earth distance in meters between the surveyed location of the weapon and the location of the weapon as computed by the WLR.</p> <p>In terms of Easting and Northing, the location error is defined as</p> $\text{Location Error}_i = [(E_0 - E_i)^2 + (N_0 - N_i)^2]^{1/2}$ <p>where E_0 and N_0 is the Easting and the Northing of the surveyed weapon location, and E_i and N_i are the Easting and the Northing of the i^{th} location of the weapon as computed by the WLR.</p> |
| Logistics Delay | Logistics Delay is that accumulated time during which a maintenance action cannot be performed due to the necessity to acquire maintenance resources, excluding any administrative delay. |
| Look Angle (azimuth) | The Look Angle (azimuth) is the angle between the bore sight azimuth of the radar antenna and the azimuth of the weapon from the radar antenna. If a two dimensional coordinate system is defined as x the east and y to the north, then x to y is defined as a positive angle. This definition of the look angle is for WLR. The look angle is measured in degrees. |
| Maintenance | Maintenance is all action taken to retain materiel in or restore it to a specified condition. It includes inspection, testing, servicing, classification as to serviceability, repair, rebuilding and reclamation. |
| Mean Time To Repair (MTTR) | MTTR is the average or expected time it takes to repair an equipment. It can be estimated by the total elapsed corrective maintenance time divided by the total number of corrective maintenance actions during a given period. |
| Mil | Unit of measure of angle equivalent to 1/6400 of a circle. There are 6400 mils in 360 degrees. |

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| Mission Planning | Mission planning normally has to do with software to help plan the best position to emplace the radar for best coverage of the target area and to minimize clutter input to the radar. This software has access to mapping data to provide an analysis of the radar coverage. |
| Operational Availability (Ao) | <p>$A_o = (EAP - TCT) / (EAP)$, where</p> <p>EAP = Expected Availability Period – calculated as 24 hours per day 7 days per week for each month.</p> <p>TCT = Total Contractor Time - period of time from when a defect / deficiency report is submitted to the Contractor until the System is returned in a serviceable condition.</p> |
| Quadrant Elevation | The Quadrant Elevation is the elevation angle of the muzzle of the weapon measured from the horizontal plane. The quadrant elevation is measured in mils. |
| Reliability | <p>Reliability is defined as:</p> <p>$R = e^{-\lambda t}$, where λ = failure rate (# failures / # hours), t = time (hours).</p> |
| Sector | Sector is the search angle in azimuth. |
| State of the Art | The term " state of the art " refers to the highest level of general development, as of a device, technique, or scientific field achieved at a particular time. It also refers to the level of development (as of a device, procedure, process, technique, or science) reached at any particular time as a result of the common methodologies employed. |
| Terrain Mask | The Terrain Mask represents the elevation angle, as a function of azimuth relative to the MRR, at which a projectile launched outside the detectable range of the system would become visible based on line of sight considerations. |
| Track Latency | With respect to air surveillance, track latency is the time that it takes to detect several plots (more than 2) and draw a track between the plots. |
| Uncooperative Target | An uncooperative target is a target that is not responding to interrogation by IFF equipment. An uncooperative target can be either hostile or friendly. |
| Volley Fire | Volley fire originates from at least 5 or more different weapons. The weapons arranged such they are 60 to 80 metres apart laterally and in depth with respect to the primary direction of fire of the battery. Volley fire represents fire that happens simultaneously however for practical reasons the fire from these weapons will be fired sequentially between 0.5 and 2 seconds apart with instructions to the gunners to fire at one second intervals. |