

**GOVERNMENT OF INDIA**  
**(Ministry of Home Affairs)**  
**DIRECTORATE GENERAL**  
**CENTRAL RESERVE POLICE FORCE**  
**EAST BLOCK-7, SEC-1, R.K. PURAM, NEW DELHI-110066**

Email:- [comncell@crpf.gov.in](mailto:comncell@crpf.gov.in) Tele Fax:011-26107493

No. B.V-7/2018-19-C (UAV)

Dated, the 27<sup>th</sup> August 2018

To

- |   |  |
|---|--|
| 1. DIG (Comn), ITBP<br>Block No. 2, CGO Complex<br>Lodhi Road, New Delhi-03 | 2. DIG (Comn), NSG<br>Meharam Nagar<br>Palam, New Delhi-37                       |
| 3. DIG (Comn), SSB<br>East Block-V, R.K Puram<br>New- Delhi-66              | 4. AIG (Comn), CISF<br>Block No. 13, CGO, Complex<br>Lodhi Road, New Delhi-03    |
| 5. DIG (Prov), BSF<br>Block No. 10, CGO Complex<br>Lodhi Road, New Delhi-03 | 6. Liaison Office, Assam Rifle<br>Room No-171, North Block, MHA<br>New Delhi -01 |

**Subject: Revised QRs/TDs of Micro Unmanned Aerial Vehicle (UAV) (60 Minutes) System.**

Please find enclosed here with revised QRs and TDs in respect of Micro Unmanned Aerial Vehicle (UAV) System (60 Mnutess) as per Annexure-A & Annexure-B respectively duly approved by the competent authority for further necessary action.

Encl: (QRs & TDs of Micro UAV System (60 Mnutess))

For Perusal please.

*Mv*  
27/8

*Mv*  
27/8  
{P.R.Jha, DC (Comn)}  
For DIGP (Equipment)

Directorate General, CRPF

*05/01*

*DIG(EQPT)*

*Ranj*  
27/8/18

No. B.V-7/2018-19-C(UAV)

Dated, the 27<sup>th</sup> August 2018

Copy to:-

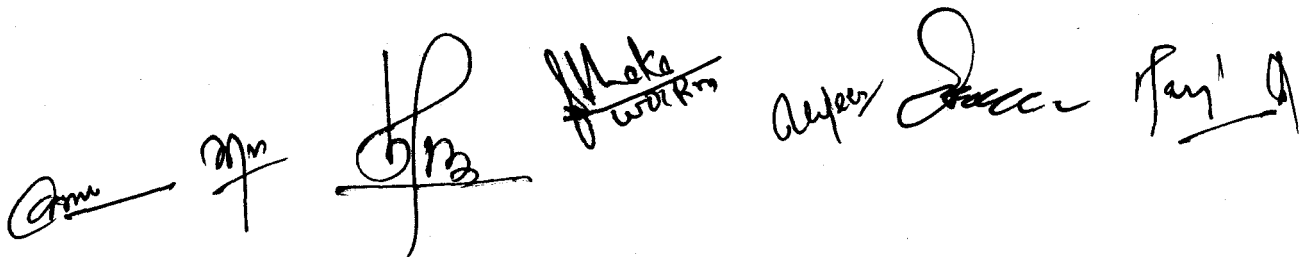
SO(IT), MHA, North Block with request to host the QRS and TDs of Micro Unmanned Aerial Vehicle (UAV) System (60 Minutes) on MHA website. Soft copy is being sent through email also.

*Mv*  
27/8  
{P.R.Jha, DC (Comn)}  
For DIGP (Equipment)  
Directorate General, CRPF

*05/01*

**QRs FOR MICRO UNMANNED AERIAL VEHICLE (UAV) SYSTEM (60 Minutes)**

| SN  | Parameter   | Specifications   |
|-----|---|--|
| 1   | <b>Micro UAV system should consist of the following sub-systems:-</b> |  |
| 1.1 | UAV Bird with battery pack  |  |
| 1.2 | Ground Control station with data link equipment                       |  |
| 1.3 | Daylight Camera Payload   |  |
| 1.4 | Night Camera Payload  |  |
| 1.5 | Universal Battery Charger with Power Supply System                    |  |
| 2   | <b>Micro UAV characteristics:-</b>                                    |  |
| 2.1 | Role  | Surveillance, reconnaissance and detection during day and night.   |
| 2.2 | Launch and Recovery mode  | i) Vertical Take Off and Landing (VTOL) from within an area of 25m x 25m clearing or less.<br>ii) Payload should not damage during recovery of UAV   |
| 2.3 | Aural Signature   | ≤40dbs at 300 meters Above Ground Level  |
| 2.4 | Payloads carrying capability  | Should have capability to carry electro Optic (EO) for day and Thermal Imager (TI) for night one at a time.<br>or<br>Integrated day & Night payload.<br>(As per user requirement)  |
| 2.5 | Flight Modes  | a) Fully Autonomous Vertical Take Off<br>b) Fully Autonomous Vertical Landing<br>c) Hover at defined waypoint<br>d) Autonomous waypoint navigation (pre-defined as well as dynamically adjustable waypoints during flight)<br>e) Remote Piloted mode for video based user navigation.<br>f) Vision based Autonomous Target Tracking of fixed and moving targets.<br>g) Should be controllable in real time from the GCS up to recovery.<br>h) Fully autonomous and stabilized. |
| 2.6 | Endurance   | 60 minutes or more with all payloads at Mean Sea Level.  |


 A series of handwritten signatures and initials at the bottom of the page. From left to right: a signature that appears to be 'Gm', a signature 'Mn', a large signature 'Gm', a signature 'Maha' with 'WARR' written below it, and a signature 'Ajay' with 'Sunder' written below it.

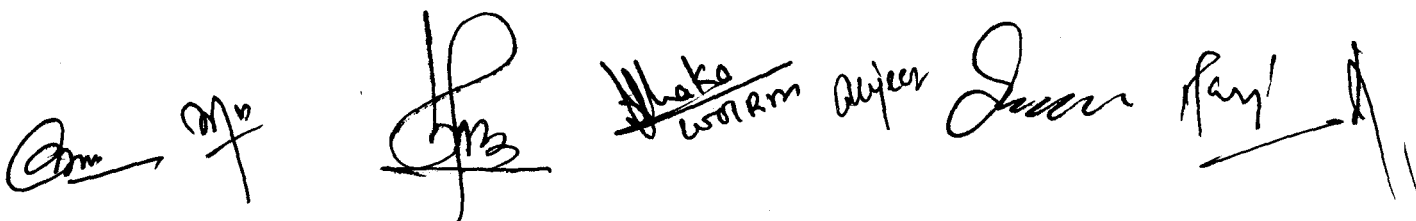
| <b>SN</b> | <b>Parameter</b>                        | <b>Specifications</b>   |
|-----------|---|---|
| 2.7       | Operating Altitude                      | 400m AGL (Above Ground Level) or more.  |
| 2.8       | Launch Altitude                         | 2000m AMSL (Above Mean Sea Level) or more   |
| 2.9       | Range of Operation                      | Minimum 5 km line of sight  |
| 2.10      | Cruise Speed                            | 25 km/h or more   |
| 2.11      | Operating Wind Conditions               | a) Take off: 20 km/h or more<br>b) Landing: 20 km/h or more<br>c) Operate: 20 km/h or more  |
| 2.12      | Failsafe features                       | a) Automatic Return to Home on communication failure<br>b) Automatic Return to Home/Land on low battery<br>c) Multiple GPS on-board for GPS failure redundancy                                |
| 2.13      | Propulsion system                       | Electrical with rechargeable batteries  |
| <b>3.</b> | <b><u>Payload characteristics:-</u></b> |   |
| 3.1       | Payloads required                       | a) Electro Optic (EO) for day (colour)<br>b) Thermal Imager (TI) for night<br>or<br>c) Integrated day & night payload.<br>(As per user requirement)   |
| 3.2       | Payload and Video Stabilization         | a) All payloads should be gimbals stabilized on-board.<br>b) Video output should be digitally stabilized at all zoom levels.<br>c) Quality of video should not be affected by UAV vibrations. |
| 3.3       | Electro optic (EO) Daylight Payload     | a) Colour Camera with 360° pan and 90° tilt control during flight.<br>b) Resolution: 1280 X 720 pixel or better   |

*Gm*      *Mm*      *GP*      *Shake warm*      *anyer*      *Juan*      *Tan!*      *A*

| SN  | Parameter  | Specifications   |
|-----|--|--|
|     |  | c) Optical Zoom: 10X zoom with minimum-FOV $\leq$ 5°, maximum-FOV $\geq$ 45° (wide field).<br>Digital zoom: 4X |
|     |  | d) Should be able to detect human size target at 750 meter slant or more                                       |
| 3.4 | Thermal Imager (TI)<br>Night Payload   | a. Thermal Camera with 360° pan and 90° tilt control during flight.  |
|     |  | b. Resolution: 640 X 480 pixels or better  |
|     |  | c)White/Black Hot modes  |
|     |  | d) Digital Zoom: 4X or more  |
|     |  | e) Should be able to detect human size target at 400 meter slant or more                                       |
| 3.5 | Night Recovery<br>Beacon   | Switchable (from GCS) LED light when operating with Night Payload  |
| 4.  | <b><u>Ground Control Station characteristics:-</u></b>   |  |
| 4.1 | Option-1: GCS should have MIL-STD-810G or better and IP51 or better, semi rugged laptop.<br><br>Option-2: GCS should have MIL-STD-810G or better and IP65 or better, rugged laptop.<br>(As per user requirement) |  |
| 4.2 | Computing Hardware :-  |  |
|     | CPU  | Intel Core i5 v Pro Processor, 2.3 GHz or better   |
|     | Storage  | Minimum 500 GB   |
|     | Memory   | 2GB or more  |
|     | Display  | Minimum 10 inch - 1024 x 768 XGA sunlight readable screen, anti-glare.   |
|     | Keyboard & input   | Touch screen   |
| 4.3 | Battery Operation  | Minimum 02 hours at peak utilisation.  |
| 4.4 | Battery Charging time of GCS   | Should be less than 3.5 hours  |
| 4.5 | Data portability   | Ports for data transfer to external secondary storage devices  |
| 4.6 | Interface  | VGA/HDMI, USB, 10/100/1000 Ethernet.   |

A series of handwritten signatures and initials are present at the bottom of the page. From left to right, they include: a signature that appears to be 'Gm', a signature 'Mn', a large stylized signature 'Gm', a signature 'Shah' with 'USDRM' written below it, a signature 'Ajay', a signature 'Sudh', and a signature 'Raj' with a large flourish.

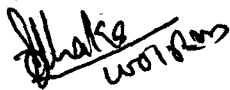
| SN  | Parameter                | Specifications  |
|-----|--------------------------|---|
| 4.7 | Capability               | a) Transmit control commands to UAV.<br>b) Receive UAV flight and propulsion parameters.<br>c) Receive, display and record real time day and night video from UAV.<br>d) Capability to control UAV while on the move.   |
| 4.8 | GCS Application Software | a) Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan.<br>b) Real-time video from the UAV with on-screen display of important parameters like:-<br>i. Coordinate of target<br>ii. Ground altitude of target<br>iii. UAV Position<br>iv. Height of UAV above ground level<br>v. Distance of UAV from GCS<br>vi. Bearing (Azimuth) of UAV from GCS<br>vii. Ground speed of UAV<br>viii. UAV Heading/ True North indication<br>ix. Mission time<br>c) Geographic map and real-time video should be displayed at all times during the flight. |
|     |                          | d) Geographic map and real-time video views should be resizable and/or switchable to allow user to switch between big map/small video and small map/big video views through a single click/button input.<br>e) Artificial Horizon indicating UAV altitude.<br>f) Switchable between 2D/3D views, capability to Tilt/rotate 3D map as per user input.  |
| 4.9 | Map Formats              | a) Should have the capability to integrate geo-referenced raster maps provided in at least one of the commonly used digital map formats (GIF, TIFF, DTED and SRTM etc.)<br>b) Should be able to work with Google Maps, application should have the capability to download maps automatically after specifying location GPS co-ordinates.  |


 A series of handwritten signatures and initials at the bottom of the page. From left to right: a signature that appears to be 'Am', initials 'M/V', a large stylized signature 'S', the name 'Shaka' with 'WARM' written below it, the name 'Ajay', the name 'Jeeva', and another signature 'Ray' followed by a large flourish.

| SN   | Parameter                                   | Specifications   |
|------|---|--|
| 4.10 | Payload Controls                            | a) Selection and switch on/off of payload  |
|      |   | b) Pan/Tilt/Zoom Controls  |
|      |   | c) Point payload to ground co-ordinate function  |
|      |   | d) Recording on/off  |
|      |   | e) Switch on/off Night Recovery Beacon   |
| 4.11 | Joystick Controls                           | i. Full Camera Control<br>Pan/Tilt<br>Zoom In/Out<br>Black/White Hot<br>ii. RPV Mode<br>iii. Altitude Control              |
| 4.12 | Video                                       | a) Video should be recorded in any commonly portable video formats (AVI/MPEG/ MP4 etc)                                     |
|      |   | b) Video of the full flight should be recorded   |
|      |   | c) Should have capability to take image snapshots at any time during flight  |
|      |   | d) Software should be provided that will facilitate extraction of imagery from the recorded video post flight              |
| 4.13 | Pre-flight checks                           | Self-test of UAV system, Output: go/no go  |
| 5.   | <b><u>Communication Link:-</u></b>          |  |
| 5.1  | Communication link equipment capability     | i) Transmit control commands from GCS to UAV   |
|      |   | ii) Transmit parameter of UAV and payload to GCS   |
|      |   | iii) Transmit day and night video from UAV to GCS  |
| 5.2  | Type of link                                | Secured digital uplink & downlink with AES encryption.   |
| 5.3  | Frequency Band                              | System should operate on S & C frequency Band uplink and down link, preferably on license free band i.e 2.4Ghz or 5.8 Ghz. |
| 6.   | <b><u>General System requirements:-</u></b> |  |
| 6.1  | Weight                                      | The weight of complete Micro UAV bird including battery pack & one payload should ≤ 6kg.                                   |
| 6.2  | Assembly/ Disassembly time                  | Less than 10 minutes each.   |
| 6.3  | Life of Micro UAV                           | The total technical life of micro UAV should not be less than 500 landings.  |

[Signatures: Am, MP, DM, Shako, Wolkem, Roper, Joon, Ray]

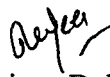
| SN  | Parameter  | Specifications   |
|-----|--|--|
| 6.4 | Environmental Conditions for Operation and Storage | The UAV and associated systems should be certified for operation and storage for following environment conditions.<br>i) Damp Heat: 40 °C at RH not less than 95%<br>ii) Operating temperature & Storage temp: -10°C to +55°C<br>iii) Ability to withstand dust, drizzle and humid conditions  |
| 6.5 | Portability and Operation                          | The Micro UAV should be battery operated portable, light in weight, compact, for day and night surveillance, capable of being carried and operated by two men.   |
| 6.6 | Battery of AV                                      | The intelligent standard lithium based battery pack should have the backup of minimum 60 minutes.  |
| 6.7 | Battery Charger of AV battery                      | Suitable universal battery charger to charge the batteries within two to three hours.  |
| 6.8 | Accessories  | a) Water proof Back Packs IP66: 1 set<br>b) Field Repair kit: 1 No's<br>c) Lithium based Battery packs: 3No's<br>d) Spare propeller Sets: 2 No's<br>e) Spare Landing Gear sets: 2 No's<br>f) Associated Cables & Mountings: 1set<br>g) Hard transportation boxes: 1set<br>h) User, Technical & Maintenance Manual: 1set<br>i) Log book : 1 set |



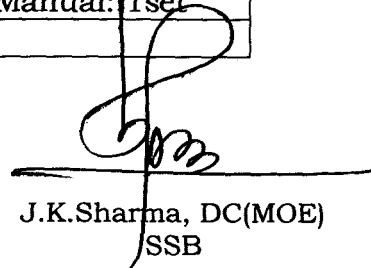
WO/RM R.S.Dhaka  
Assam Rifles



INSP/T V.K.Kothiyal  
BSF



INSP.Rajeev Dahiya  
CISF



J.K.Sharma, DC(MOE)  
SSB



P.R.Jha, DC(UAV)  
CRPF



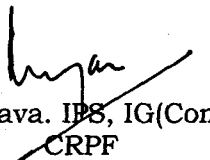
B.N.Sonawan, 2 I/C  
ITBP



Harjinder Singh, DIG(Eqpt)  
CRPF



D.S.Rawat, DIG(Comn)  
CRPF

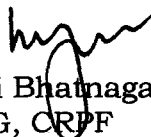


Raju Bhargava. IPS, IG(Comn &IT),  
CRPF



R.P.Singh. IPS, SDG(Comn)  
CRPF

Approved/Not Approved



Rajeev Rai Bhatnagar, IPS  
DG, CRPF

**TRIAL DIRECTIVES OF MICRO UNMANNED AERIAL VEHICLE (UAV) SYSTEM (60 Minutes)**

Trial/Technical evaluation of UAV will be conducted by a Board of Officers (B.O.O.) to assess actual performance of the equipment.

2. All parameters/Specifications mentioned in QRs will be checked by the Board of Officers in the presence of representative of firm.

i) **Physically check:-** In this category, specifications of the equipment will be checked physically as per QRs.

ii) **Practically check:-** The representative of firm will show all the features/ configuration of the equipment to the board of officers during trial.

iii) **Submission of certificates:-** Firm will provide certificate from Govt. Lab. or DRDO or NABL accredited or ILAC accredited laboratory which are mentioned in respective parameters.

| SN  | Parameter   | Specifications  | Trial directives  |
|-----|---|---|---|
| 1   | <b>Micro UAV system should consist of the following sub-systems:-</b> |   |   |
| 1.1 | UAV Bird with battery pack  |   | Board will check physically and practically.  |
| 1.2 | Ground Control station with data link equipment                       |   |   |
| 1.3 | Daylight Camera Payload   |   |   |
| 1.4 | Night Camera Payload  |   |   |
| 1.5 | Universal Battery Charger with Power Supply System                    |   |   |
| 2   | <b>Micro UAV characteristics:-</b>                                    |   |   |
| 2.1 | Role  | Surveillance, reconnaissance and detection during day and night.  | Board will check practically.   |
| 2.2 | Launch and Recovery mode  | i) Vertical Take Off and Landing (VTOL) from within an area of 25m x 25m clearing or less.<br>ii) Payload should not damage during recovery of UAV                                | Board will check practically.   |
| 2.3 | Aural Signature   | ≤40dbs at 300 meters Above Ground Level   | The firm will submit certificate of Govt. Lab. or DRDO or NABL or ILAC accredited laboratory. |
| 2.4 | Payloads carrying capability  | Should have capability to carry electro Optic (EO) for day and Thermal Imager (TI) for night one at a time.<br>or<br>Integrated day & Night payload.<br>(As per user requirement) | Board will check practically.   |

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that looks like 'Zm', a large signature 'Am', a signature 'Shaks' with 'WLR' written below it, a signature 'Ajay', and another signature 'Jau'. There are also some other initials and marks scattered around.



| SN   | Parameter                 | Specifications  | Trial directives   |
|------|---------------------------|---|--|
| 2.5  | Flight Modes              | a) Fully Autonomous Vertical Take Off   | Board will check practically.  |
|      |                           | b) Fully Autonomous Vertical Landing  | Board will check practically.  |
|      |                           | c) Hover at defined waypoint  | Board will check practically.  |
|      |                           | d) Autonomous waypoint navigation (pre-defined as well as dynamically adjustable waypoints during flight) | Board will check practically.  |
|      |                           | e) Remote Piloted Mode for video based user navigation.   | Board will check practically.  |
|      |                           | f) Vision based Autonomous Target Tracking of fixed and moving targets.                                   | Board will check practically.  |
|      |                           | g) Should be controllable in real time from the GCS up to recovery.                                       | Board will check it practically.   |
|      |                           | h) Fully autonomous and stabilized.   | Board will check it practically.   |
| 2.6  | Endurance                 | 60 minutes or more with all payloads at Mean Sea Level.   | Board will check practically with maximum payload up to launch altitude of 1000 meter Above Mean Sea Level (AMSL). |
| 2.7  | Operating Altitude        | 400m AGL (Above Ground Level) or more.  | Board will check practically.  |
| 2.8  | Launch Altitude           | 2000m AMSL (Above Mean Sea Level) or more   | Firm will submit OEM certificate.  |
| 2.9  | Range of Operation        | Minimum 5 km line of sight  | Board will check practically.  |
| 2.10 | Cruise Speed              | 25 km/h or more   | Board will check practically.  |
| 2.11 | Operating Wind Conditions | a) Take off: 20 km/h or more<br>b) Landing: 20 km/h or more<br>c) Operate: 20 km/h or more                | Board will check practically or firm will also submit OEM certificate.   |
| 2.12 | Failsafe features         | a) Automatic Return to Home on communication failure  | Board will check practically.  |
|      |                           | b) Automatic Return to Home/ Land on low battery  | Board will check practically.  |
|      |                           | c) Multiple GPS on-board for GPS failure redundancy   | Firm will submit OEM certificate.  |

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'An', a signature that looks like 'Om', a large stylized signature that could be 'Harj', a signature that says 'Maha' with 'WOT Rm' written below it, and a long, flowing signature that appears to be 'Ajay' followed by a circled 'A'.

| SN   | Parameter  | Specifications   | Trial directives  |
|------|--|--|---|
| 2.13 | Propulsion system  | Electrical with rechargeable batteries   | Board will check practically.   |
| 3.   | <b>Payload characteristics:-</b>   |  |   |
| 3.1  | Payloads required  | a) Electro Optic (EO) for day (colour)<br>b) Thermal Imager (TI) for night<br>or<br>c) Integrated day & night payload.<br>(As per user requirement)  | Board will check practically after fitting the required payloads and ensure that UAV working satisfactorily.  |
| 3.2  | Payload and Video Stabilization  | a) All payloads should be gimbals stabilized on-board.<br>b) Video output should be digitally stabilized at all zoom levels.<br>c) Quality of video should not be affected by UAV vibrations.  | Board will check practically all parameters.  |
| 3.3  | Electro optic (EO) Daylight Payload  | a) Colour Camera with 360° pan and 90° tilt control during flight.<br>b) Resolution: 1280 X 720 pixel or better<br>c) Optical Zoom: 10X zoom with minimum-FOV≤5°, maximum-FOV ≥ 45° (wide field). Digital zoom: 4X<br>d) Should be able to detect human size target at 750 meter slant or more | Board will check practically and ensure day payload working as per their parameters and firm will also submit OEM certificate for resolution and FOV.   |
| 3.4  | Thermal Imager (TI) Night Payload  | a. Thermal Camera with 360° pan and 90° tilt control during flight.<br>b. Resolution: 640 X 480 pixels or better<br>c)White/Black Hot modes<br>d) Digital Zoom: 4X or more<br>e) Should be able to detect human size target at 400 meter slant or more   | Board will check practically and ensure night payload working as per their parameters and firm will also submit OEM certificate for resolution and FOV. |
| 3.5  | Night Recovery Beacon  | Switchable (from GCS) LED light when operating with Night Payload  | Board will check practically.   |
| 4.   | <b>Ground Control Station characteristics:-</b>  |  |   |
| 4.1  | Option-1: GCS should have MIL-STD-810G or better and IP51 or better, semi rugged laptop.<br><br>Option-2: GCS should have MIL-STD-810G or better and IP65 or better, rugged laptop.<br>(As per user requirement) |  | Firm will submit certificate of Govt. Lab. or NABL accredited or ILAC accredited laboratory.  |

Mr. [Signature] [Signature] [Signature] [Signature] [Signature]
   
 [Signature] [Signature] [Signature]

| SN  | Parameter                    | Specifications  | Trial directives  |
|-----|------------------------------|---|---|
| 4.2 | Computing Hardware :-        |   | BOO will check practically and firm will also submit OEM certificate. |
|     | CPU                          | Intel Core i5 v Pro Processor, 2.3 GHz or better  |   |
|     | Storage                      | Minimum 500 GB  |   |
|     | Memory                       | 2GB or more   |   |
|     | Display                      | Minimum 10 inch - 1024 x 768 XGA sunlight readable screen, anti-glare.  |   |
|     | Keyboard & input             | Touch screen  |   |
| 4.3 | Battery Operation            | Minimum two hours at peak utilisation.  | Board will check practically.   |
| 4.4 | Battery Charging time of GCS | Should be less than 3.5 hours   | Board will check practically.   |
| 4.5 | Data portability             | Ports for data transfer to external secondary storage devices   | Board will check practically.   |
| 4.6 | Interface                    | VGA/HDMI, USB, 10/100/1000 Ethernet.  | Board will check practically.   |
| 4.7 | Capability                   | a) Transmit control commands to UAV.<br>b) Receive UAV flight and propulsion parameters.<br>c) Receive, display and record real time day and night video from UAV.<br>d) Capability to control UAV while on the move.   | Board will check capability.  |
| 4.8 | GCS Application Software     | a) Geographic Map along with UAV location, UAV trajectory, camera view polygon, waypoints and flight plan.<br>b) Real-time video from the UAV with on-screen display of important parameters like:- <ol style="list-style-type: none"> <li>i. Coordinate of target</li> <li>ii. Ground altitude of target</li> <li>iii. UAV Position</li> <li>iv. Height of UAV above ground label</li> <li>v. Distance of UAV from GCS</li> <li>vi. Bearing (Azimuth) of UAV from GCS</li> <li>vii. Ground speed of UAV</li> <li>viii. UAV Heading/ True North indication</li> <li>ix. Mission time</li> </ol> | Board will check practically.   |

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'M/S', a large stylized signature, a signature with 'WALKER' written below it, a signature that looks like 'Ajay', and a final signature on the far right.

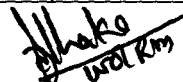
| SN   | Parameter         | Specifications   | Trial directives              |
|------|-------------------|--|-------------------------------|
|      |                   | <p>c) Geographic map and real-time video should be displayed at all times during the flight.</p> <p>d) Geographic map and real-time video views should be resizable and/or switchable to allow user to switch between big map/small video and small map/big video views through a single click/button input.</p> <p>e) Artificial Horizon indicating UAV altitude.</p> <p>f) Switchable between 2D/3D views, capability to Tilt/rotate 3D map as per user input.</p> | Board will check practically. |
| 4.9  | Map Formats       | <p>a) Should have the capability to integrate geo-referenced raster maps provided in at least one of the commonly used digital map formats (GIF, TIFF, DTED and SRTM etc.)</p> <p>b) Should be able to work with Google Maps, application should have the capability to download maps automatically after specifying location GPS co-ordinates.</p>  | Board will check practically. |
| 4.10 | Payload Controls  | <p>a) Selection and switch on/off of payload</p> <p>b) Pan/Tilt/Zoom Controls</p> <p>c) Point payload to ground co-ordinate function</p> <p>d) Recording on/off</p> <p>e) Switch on/off Night Recovery Beacon</p>  | Board will check practically. |
| 4.11 | Joystick Controls | <p>i. Full Camera Control<br/>Pan/Tilt<br/>Zoom In/Out<br/>Black/White Hot</p> <p>ii. RPV Mode</p> <p>iii. Altitude Control</p>  | Board will check practically. |
| 4.12 | Video             | <p>a) Video should be recorded in any commonly portable video formats (AVI/MPEG/ MP4 etc)</p> <p>b) Video of the full flight should be recorded</p> <p>c) Should have capability to take image snapshots at any time during flight</p> <p>d) Software should be provided that will facilitate extraction of imagery from the recorded video post flight</p>  | Board will check practically. |

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'Omni', a signature that looks like 'Pay', a signature that includes the word 'Shaka' and 'WDRM', a signature that looks like 'Ajeer, J...', and a final signature that is partially cut off on the right.

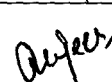
| SN                                      | Parameter  | Specifications  | Trial directives   |
|---|--|---|--|
| 4.13                                    | Pre-flight checks                                  | Self-test of UAV system, Output: go/no go   | Board will check practically.  |
| <b>5. Communication Link:-</b>          |  |   |  |
| 5.1                                     | Communication link equipment capability            | i) Transmit control commands from GCS to UAV  | Board will check practically.  |
|   |  | ii) Transmit parameter of UAV and payload to GCS  |  |
|   |  | iii) Transmit day and night video from UAV to GCS   |  |
| 5.2                                     | Type of link                                       | Secured digital uplink & downlink with AES encryption.  | Firm will submit OEM certificate.  |
| 5.3                                     | Frequency Band                                     | System should operate on S & C frequency Band uplink and down link, preferably on license free band i.e 2.4 Ghz or 5.8 Ghz. | Firm will submit OEM certificate.  |
| <b>6. General System requirements:-</b> |  |   |  |
| 6.1                                     | Weight   | The weight of complete Micro UAV bird including battery pack & one payload should $\leq$ 6kg.                               | Board will check practically.  |
| 6.2                                     | Assembly/ Disassembly time                         | Less than 10 minutes each.  | Board will check practically.  |
| 6.3                                     | Life of Micro UAV                                  | The total technical life of micro UAV should not be less than 500 landings.   | Firm will submit OEM certificate.  |
| 6.4                                     | Environmental Conditions for Operation and Storage | The UAV and associated systems should be certified for operation and storage for following environment conditions.          | Firm will submit certificate of Govt. Lab. or NABL accredited or ILAC accredited laboratory. |
|   |  | i) Damp Heat: 40 °C at RH not less than 95%   |  |
|   |  | ii) Operating temperature & Storage temp: -10°C to +55°C  |  |
|   |  | iii) Ability to withstand dust, drizzle and humid conditions  |  |


The bottom of the page contains several handwritten signatures and initials in black ink. From left to right, there is a signature that appears to be 'Amu', a signature that looks like 'Pr', a signature that looks like 'Shaka' with 'USU Rm' written below it, a signature that looks like 'Ajay', and a final signature that looks like 'Jee' with a checkmark to its right.

| SN  | Parameter                     | Specifications   | Trial directives   |
|-----|-------------------------------|--|--|
| 6.5 | Portability and Operation     | The Micro UAV should be battery operated portable, light in weight, compact, for day and night surveillance, capable of being carried and operated by two men.   | Board will check practically.  |
| 6.6 | Battery of AV                 | The intelligent standard lithium based battery pack should have the backup of minimum 60 minutes.  | Board will check practically and firm will also submit OEM certificate for chemistry of battery.   |
| 6.7 | Battery Charger of AV battery | Suitable universal battery charger to charge the batteries within two to three hours.  | Board will check practically.  |
| 6.8 | Accessories                   | a) Water proof Back Packs IP66: 1 set<br>b) Field Repair kit: 1 No's<br>c) Lithium based Battery packs; 3No's<br>d) Spare propeller Sets: 2 No's<br>e) Spare Landing Gear sets: 2 No's<br>f) Associated Cables & Mountings: 1set<br>g) Hard transportation boxes: 1set<br>h) User, Technical & Maintenance Manual: 1set<br>i) Log book : 1 set | Board will check physically and firm will also submit certificate of Govt. Lab. or NABL accredited or ILAC accredited laboratory for IP66. |


  
 WO/RM R.S.Dhaka  
 Assam Rifles

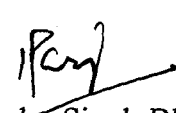
  
 INSP/T V.K.Kothiyal  
 BSF

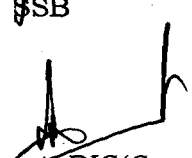
  
 INSP.Rajeev Dahiya  
 CISF

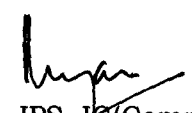
  
 J.K.Sharma, DC(MOE)  
 SSB

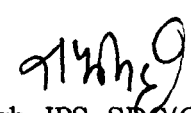
  
 P.R.Jha, DC(UAV)  
 CRPF

  
 B.N.Sonawan, 2 I/C  
 ITBP

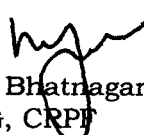
  
 Harjinder Singh, DIG(Eqpt)  
 CRPF

  
 D.S.Rawat, DIG(Comn)  
 CRPF

  
 Raju Bhargava, IPS, IG(Comn &IT),  
 CRPF

  
 R.P.Singh, IPS, SDG(Comn)  
 CRPF

Approved/Not Approved

  
 Rajeev Rai Bhatnagar, IPS  
 DG, CRPF