F.No. W-42011(494)/QRs/CISF/Tech/2008/MHA-Prov-I

Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 08th September, 2016

To,

DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

Subject: Revised QRs/Trial Directive of X-Ray Baggage Inspection System (Large & Small).

Reference this Ministry letter number IV-21011/18/2009-Prov-I dated 18.01.2011 and letter 14.11.2014 vide which QRs/Technical Specification & Trial Directives of X-Ray Baggage Inspection System (Large & Small) has been notified respectively.

2. Now the revised QRs and Trial Directives of X-Ray Baggage Inspection System (Large Size) as per Annexure-'A' & 'B' and revised QRs and Trial Directives of X-Ray Baggage Inspection System (Small Size) as per Annexure-'A' & 'B' respectively have been accepted by the Competent Authority in MHA.

3. The CAPFs concerned will be accountable for correctness of the QRs/Trial Directives.

4. Henceforth, all the CAPFs should procure the above item required by them strictly as per the laid down Technical Specifications/QRs.

Yours faithfully,

Encl: As above.

08/9/16
(Ritesh Kumar)
Under Secretary to the Govt of India
Tel: 23381278

Copy forwarded for necessary action to :-

The Section Officer (IT), MHA: It is requested to host the QRs and Trial Directives (soft copy attached) on the MHA website (under the page of Organizational Set up- Police Modernization Division- Qualitative Requirement under BDDS Equipments by replacing earlier QRs/Trial Directives of above equipments.

08/9/16
(V. Devadas)
Section Officer (Prov-I)

Copy to: DDG (Procurement), MHA

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Appendix –'A'

Directorate General Border Security Force

(Prov Dte: Mod Cell)

The Sub-group of technical experts on surveillance equipment constituted by MHA vide their letter No. IV-17017/18/2001-Prov-I dated 05 Jul 2002 held its meeting at BSF HQ 07th March 2016 & 13th May 2016 to formulate the QRs of **'X-Ray Baggage Inspection System (Large Size).'**

After detailed deliberations the referred Sub-group has finalized the QRs of **'X-Ray Baggage Inspection System (Large Size)'** which are as under:-

REVISED DRAFT QUALITATIVE REQUIREMENT OF X-RAY BAGGAGE INSPECTION SYSTEM (LARGE SIZE).

Sl.	Revised Technical Specifications
1.	Minimum Tunnel Size - 100 cm W (width) x 100 cm (Height) or better
2.	Conveyor belt speed should be between 0.18 and 0.3 meter per second. Conveyor movement bidirectional.
3.	All machines should operate on 230 VAC, 50 Hz power supply and should be able to withstand voltage fluctuations in the range of 170V to 260 V. Single Phase, 3 to 5 Amp.
4.	Conveyor Capacity- 200 kg or more
5.	Through put should be 200 bags per hour or more
6.	Sensors > 1000 diodes, L-shaped detector (Folded array type), In case of defective diode arrays, scanning should be disabled and error message should be displayed on the screen.
7.	X-Ray Voltage - 160 kV to 185 KV
8.	X-Ray Source/Generator – It should be capable to operate smoothly for a period of at least six years.
9.	Duty Cycle - 100%
10.	The X-ray beam divergence should be such that the complete image at maximum size of bag is displayed without corner cuts.
11.	The radiation level should not exceed accepted health standard (0.1m R/Hr at a distance of 5 CM from external housing). Relevant certificate from AERB.
12.	The operating temperature should be 0 deg C to 40 deg C.
13.	Storage temperature 0 degree C to 50 degree C.
14.	Humidity- 90% non-condensing
15.	Resolution: The machine should be able to display single un-insulated tinned copper wire of 42-SWG or 38-AWG. All penetration and resolution condition should be met without pressing any functional key and should be online.
16.	Penetration should be 35 mm thickness of steel or more.
17.	Continuous Electronic Zoom facility should be available to magnify the chosen area of an image eight times (8X) or more. Image features shall be keyboard controllable.
18.	Video display- 18.5" or better LCD Monitor SVGA High resolution, low radiation, flicker free, resolution at least 1280 x 1024, 24 bit colour real time processing.
19.	The machine should have features of Multi-energy X-ray imaging facility where materials of different atomic number will be displayed in different colours to distinguish between organic and inorganic materials. With this method to distinguish high density organic materials including explosives. Machine should have variable colour or materials stripping to facilitate the operator to monitor images of organic materials for closer scrutiny. All suspicious items (Explosives, High density, material narcotics) should be displayed in one mode and that should be on line.
20.	Radiation Safety:- The machine must comply with requirements of health and safety

Sl.	Revised Technical Specifications
	regulations with regard to mechanical electrical and radiation hazards. Before installation of the machine, the supplier/manufacturer should furnish relevant certificate from Atomic Energy Regulatory Board of India regarding radiation safety. The company manufacturing the equipment should have ISO certification for manufacturing and servicing of X-ray Screening machines.
21.	Film Safety:- Guaranteed safety for high-speed films up to ISO1600. The machines should be film safe. In other words photographic films must not be damaged due to x-ray examination.
22.	Machine should be properly sealed from all the sides for pest proof. Dust proof cover is to be provided for covering when system is not in use.
23.	Facility for variable contrast must be incorporated to allow enhancement lighter and darker portion of the image.
24.	The machine should be so designed that software enhancement can be easily implemented to take care of new technique in image processing and pattern recognition.
25.	Full diagnostic built in test facility. All models should have software controlled diagnosis report facility and system should give printout if printer is connected.
26.	All software features of machine should be online and password protected.
27.	Machine should be capable for recalling 15 or more previous images,
28.	It should have the capability of archiving 2000 or more images with date & time stamp.
29.	Control desk with security housing and locking provision should be available. The operator personal identification number can be entered the keyboard along with generation of log.
30.	Facility of image enhancement should be available.
31.	All models should have online recording facility and images can be recorded in CD R/W or/and USB and should be able to view images so recorded on stand-alone PC.
32.	Lead impregnated safety screens should be available at either ends of the tunnel. This should be covered by relevant AERB certificate. Idle rollers to be provided at either ends of the tunnel to facilitate placing of baggage at input and output.
33.	All software features should be controlled from key board and mouse of machine. Keyboard function should be user friendly. To enable/disable the software features system should not be rebooted.
34.	If the machine fails to penetrate a particular item then an alarm video and audio both should be generated to notify the operator
35.	The threat image projection (TIP) system software to be incorporated in all X-Ray BIS operation as per details given in Annexure-I.
36.	Copy of all software including X-Ray Software with recovery CD must be provided.
37.	Operational Training- Operating staff has to be provided free training.
38.	Operating & service manual shall be provided with each machine.
39.	Other Features a) Edge & variable edge enhancement. b) Inverse Video c) Set up time not more than 10 minutes. d) Pseudo colour e) Date & Time display.
40.	Minimum Computer configuration 1. **CPU:** Should be able to deliver the output to meet the specifications mentioned as above
	1. **Hard Disk Drive:** 500 GB 7200 rpm serial ATA HDD or Better 2. **Mouse:** Optical 3. **Ports:** 6 USB Ports (with at least 2 in Front), 1 Serial Port, 1 Parallel port, 1 PS/2

Sl.	Revised Technical Specifications
	Keyboard and 1 PS2 Mouse Port, audio ports for microphone and headphone in front. 4. CD-R/RW Drive : DVD Writer 5. Networking facility : 10/100/1000 on board integrated Network Port with remote booting facility remote system installation, remote wake up, out of band management using any standard management software.
41.	UPS: - 3 KVA or better online with back-up time of ½ hour to whole system.
TIPS Feature	
	Threat Image Projection
01	Tip software facility shall be incorporated in the offered X-ray machine to assist supervisors in testing the operator alertness and training X-ray screeners to improve their ability in identifying specific threat object. The system will create a threat object and the same will be superimposed on the monitor screen while a bag is being screened. To acknowledge that the operator has seen the false object, operator must press the control panel key that will cause the computer generated threat object to disappear from x-rayed bag image on the VDU screen. Each operators action shall be recorded in the hard disc of the computer for the auditing purpose by the supervisor or other authorized person.
	DESIGN OF THE SYSTEM:
02	Tip software should be compatible with other X-ray technologies such as automatic reject unit. Dual X-Ray screen technologies, automatic treat recognition system etc. All x-ray image functions must be available at the same time along with the TIP.
	IMAGE LIBRARY
03	The image library should have an image library containing at least 100 explosives devices, 100 knives and 100 firearms in various sizes, shapes, locations and orientations. However, the system shall have facility to expand the library to incorporate additional images by user without assistance of the manufacture.
04	The image library should contain images of threats at different orientations both plan and end on orientation should be used. Although these will be assigned different file names and references, it must be possible to cross-reference these as the same threat. All threat image Projection images must be realistic, representative and non distinguishable from real threat items.
	TIME INTERVAL
05	Programming facility shall be available to project threat images in different intervals. The time period for threat image as well as image mix in percentage shall be user programmable e.g. software shall select 40% images of explosive devices, 35% of fire arms & 25% knives or random etc.
06	Once the screener has responded to identify the computer generated threat image, it should remain on the screen for a predefined user programmatic feedback message shall be visible to the screener.
	SYSTEM ADMINISTRATION
07	The threat image projection facility shall have details of user data-base such as Department name, screener name, Organization, User ID Number, level of access such screener, administrator, Maintenance & Password etc.
08	Access to start up menu should be restricted only to the authorized individuals. A log-in procedure by means of Password" or "Security Key" could achieve restricted access to each of the comment. The log-in procedure should not take longer than 20 seconds. The system should have facility to by pass the TIP facility, if programmed so by the system administrator. It is to be ensured that the TIP software shall not be hindrance to normal functioning of x-ray machines.

Sl.	Revised Technical Specifications
09.	When the operator logs-in or logs-out message should be displayed on x-ray BIS VDU Screen to confirm that the/she has been correctly logged-in or logged-out.
	FEED BACK REPORT
10	The threat image Projection should be capable of giving feedback "HIT,MISS or FALSE ALARM" message. No message will be presented if a screener correctly passed as clear bag.
11.	A "HIT" message to be presented when a screener has correctly identified a Threat image Projection Image. A "MISS" : message shall be presented when screener fails to identify the TIP image. A "False Alarm" message shall be given when screener incorrectly indicate TIP image when in fact no threat image projection is present. The feedback should clearly indicate in a screen that a tip object has been correctly identified/tip object has been missed/ that a TIP object has been missed/no TIP object was present. Information should be recorded in the database.
12.	Different colour coding shall be used for feedback to the Screener., It is recommended that colour code "Red for MISS" Green for " HIT" and Yellow to False Alarm or interrupt" be used.
13.	The system shall automatically prepare the daily log of events for each shift and for each Screener performance. TIP log shall include particulars of Name of Screener, Time & date of threat image, weather threat image was successfully identified or missed etc.
14.	The report on Threat Image Projection system may have date and time (From - to) as per requirement. Screener particulars, and decision/out come i.e. MISS, HIT or False Alarm in percentage as well in absolute numbers, numbers of bags screened, categories such as explosives devices knife or weapon etc.
15.	As a standard practice, daily/weekly /monthly report shall be retrieved. Report shall be for any given time and period, as per command.
16.	All data should be stored on the system for a minimum of two months after it has been down loaded. No individual, regardless of access rights to the Threat Image Projection components would delete or amend any of threat image Projection data or time i.e. Threat Image Projection data on the actual X-ray machine will be read only file.

(B C Joshi), DIG, SIW BSF

(Rajesh Ekka), Dy Dir DCPW

(Rabish Chandra) DC BSF

(R K Meel), Dy Comdt CISF

(Satvinder Singh), AC ITBP

(A K Shukla), AC CISF

(G Bajan), Insp (Comn) SSB

(Rahul Kumar), ASI/RM SIW BSF

APPROVED/NOT APPROVED

(K K SHARMA) IPS
DIRECTOR GENERAL
BORDER SECURITY FORCE

Appendix –'B'

REVISED DRAFT TRIAL DIRECTIVES OF X-RAY BAGGAGE INSPECTION SYSTEM (LARGE SIZE).

	Revised Technical Specifications	Trial Directives
1.	Minimum Tunnel Size - 100 cm W (width) x 100 cm (Height) or better	To be physically checked by the BOO through measuring instrument.
2.	Conveyor belt speed should be between 0.18 and 0.3 meter per second. Conveyor movement bidirectional.	To be physically checked by the BOO through Tachometer.
3.	All machines should operate on 230 VAC, 50 Hz power supply and should be able to withstand voltage fluctuations in the range of 170V to 260 V. Single Phase, 3 to 5 Amp.	Plug the machine through electrical component and check the operation of the machine within the specified range of power supply.
4.	Conveyor Capacity- 200 kg or more	To be physically checked,
5.	Through put should be 200 bags per hour or more	To be physically checked,
6.	Sensors > 1000 diodes, L-shaped detector (Folded array type), In case of defective diode arrays, scanning should be disabled and error message should be displayed on the screen.	To be physically checked,
7.	X-Ray Voltage - 160 KV to 185 kV	Plug the machine through electrical component and verify the X-Ray voltage on the screen of VDU.
8.	X-Ray Source/Generator – It should be capable to operate smoothly for a period of at least six years.	An OEM certificate be obtained from the Vendor.
9.	Duty Cycle - 100%	An OEM certificate be obtained from the Vendor.
10.	The X-ray beam divergence should be such that the complete image at maximum size of bag is displayed without corner cuts.	Place the baggage in the tunnel of machine and see the image on VDU.
11.	The radiation level should not exceed accepted health standard (0.1m R/Hr at a distance of 5 CM from external housing). Relevant certificate from AERB.	An AERB certificate should be obtained from the Vendors.
12.	The operating temperature should be 0 deg C to 40 deg C.	NABL certificate be obtained from the Vendor.
13.	Storage temperature 0 degree C to 50 degree C.	NABL certificate be obtained from the Vendor.
14.	Humidity- 90% non-condensing	NABL certificate be obtained from the Vendor.
15.	Resolution: The machine should be able to display single un-insulated tinned copper wire of 42-SWG or 38-AWG. All penetration and resolution condition should be met without pressing any functional key and should be online.	Scan the CTP in operational condition of machine without operating any functional key, thereafter 42-SWG or 38-AWG wire should be seen on the VDU.
16.	Penetration should be 35 mm thickness of steel or more.	Scan the CTP in operational condition of machine and see the image of 35 mm thickness of steel on VDU.

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Sl.	Revised Technical Specifications	Trial Directives
17.	Continuous Electronic Zoom facility should be available to magnify the chosen area of an image eight times (8X) or more. Image features shall be keyboard controllable.	Scan the baggage and zoom in the facility eight times or more through zoom key from the key board.
18.	Video display- 18.5" or better LCD Monitor SVGA High resolution, low radiation, flicker free, resolution at least 1280 x 1024, 24 bit colour real time processing.	To be checked through the technical literature.
19.	The machine should have features of Multi-energy X-ray imaging facility where materials of different atomic number will be displayed in different colours to distinguish between organic and inorganic materials. With this method to distinguish high density organic materials including explosives. Machine should have variable colour or materials stripping to facilitate the operator to monitor images of organic materials for closer scrutiny. All suspicious items (Explosives, High density, material narcotics) should be displayed in one mode and that should be on line.	Scan the CTP and check the multi energy X-ray imaging facility through the multi energy test (i.e. sugar & salt) to distinguish inorganic & organic materials with the colours on the VDU.
20.	Radiation Safety:- The machine must comply with requirements of health and safety regulations with regard to mechanical electrical and radiation hazards. Before installation of the machine, the supplier/manufacturer should furnish relevant certificate from Atomic Energy Regulatory Board of India regarding radiation safety. The company manufacturing the equipment should have ISO certification for manufacturing and servicing of X-ray Screening machines.	AERB certificate be obtained from the Vendors.
21.	Film Safety:- Guaranteed safety for high-speed films up to ISO1600. The machines should be film safe. In other words photographic films must not be damaged due to x-ray examination.	AERB certificate be obtained from the Vendors.
22.	Machine should be properly sealed from all the sides for pest proof. Dust proof cover is to be provided for covering when system is not in use.	To be physically checked by BOO.
23.	Facility for variable contrast must be incorporated to allow enhancement lighter and darker portion of the image.	Scan the baggage through X-Ray machine and operate the variable contrast key for checking of enhancement of darker portion of the image.
24.	The machine should be so designed that software enhancement can be easily implemented to take care of new technique in image	OEM certificate to be obtained.

Sl.	Revised Technical Specifications	Trial Directives
	processing and pattern recognition.	
25.	Full diagnostic built in test facility. All models should have software controlled diagnosis report facility and system should give printout if printer is connected.	To be physically checked by the BOO.
26.	All software features of machine should be online and password protected.	To be physically checked by the BOO.
27.	Machine should be capable for recalling 15 or more previous images,	To be physically checked by the BOO.
28.	It should have the capability of archiving 2000 or more images with date & time stamp.	To be physically checked by the BOO.
29.	Control desk with security housing and locking provision should be available. The operator personal identification number can be entered the keyboard along with generation of log.	To be physically checked by the BOO.
30.	Facility of image enhancement should be available.	Scan the baggage through X-Ray machine and operate the image enhancement key available on the keyboard.
31.	All models should have online recording facility and images can be recorded in CD R/W or/and USB and should be able to view images so recorded on stand-alone PC.	To be physically checked by the BOO.
32.	Lead impregnated safety screens should be available at either ends of the tunnel. This should be covered by relevant AERB certificate. Idle rollers to be provided at either ends of the tunnel to facilitate placing of baggage at input and output.	AERB certificate to be obtained from the Vendors,
33.	All software features should be controlled from key board and mouse of machine. Keyboard function should be user friendly. To enable/disable the software features system should not be rebooted	To be physically checked by the BOO.
34.	If the machine fails to penetrate a particular item then an alarm video and audio both should be generated to notify the operator	To be physically checked by the BOO.
35.	The threat image projection (TIP) system software to be incorporated in all X-Ray BIS operation as per details given in Annexure-I.	To be physically checked by the BOO as per Annexure-I.
36.	Copy of all software including X-Ray Software with recovery CD must be provided.	X-Ray software with recovery CD be obtained from the Vendor by the BOO.

Sl.	Revised Technical Specifications	Trial Directives
37.	Operational Training- Operating staff has to be provided free training.	A written agreement be obtained from the Vendor by the BOO.
38.	Operating & service manual shall be provided with each machine.	A written agreement be obtained from the Vendor.
39.	Other Features a) Edge & variable edge enhancement. b) Inverse Video c) Set up time not more than 10 minutes. d) Pseudo colour e) Date & Time display.	The features mentioned at 39(a), (b), (d) & (e) to be physically checked by the BOO after scanning the baggage through X-Ray machine. The feature 39(c) to be physically checked by the BOO. Time should be noted from plugging the machine through electrical component to bring the machine in operation condition.
40.	Minimum Computer configuration 1. **CPU:** Should be able to deliver the output to meet the specifications mentioned as above. 1. **Hard Disk Drive:** 500 GB 7200 rpm serial ATA HDD or Better 2. **Mouse:** Optical 3. **Ports:** 6 USB Ports (with at least 2 in Front), 1 Serial Port, 1 Parallel port, 1 PS/2 Keyboard and 1 PS2 Mouse Port, audio ports for microphone and headphone in front. 4. CD-R/RW Drive : DVD Writer. 5. Networking facility : 10/100/1000 on board integrated Network Port with remote booting facility remote system installation, remote wake up, out of band management using any standard management software.	All features to be checked through technical literature in addition to physical verification.
41.	UPS: - 3 KVA online with back-up time of ½ hour to whole system.	To be physically checked by the BOO.
	TIPS Feature	
	Threat Image Projection	
01	Tip software facility shall be incorporated in the offered X-ray machine to assist supervisors in testing the operator alertness and training X-ray screeners to improve their ability in identifying specific threat	To be physically checked by the BOO.

Sl.	Revised Technical Specifications	Trial Directives
	object. The system will create a threat object and the same will be superimposed on the monitor screen while a bag is being screened. To acknowledge that the operator has seen the false object, operator must press the control panel key that will cause the computer generated threat object to disappear from x-rayed bag image on the VDU screen. Each operators action shall be recorded in the hard disc of the computer for the auditing purpose by the supervisor or other authorized person.	
	DESIGN OF THE SYSTEM:	
02	Tip software should be compatible with other X-ray technologies such as automatic reject unit. Dual X-Ray screen technologies, automatic treat recognition system etc. All x-ray image functions must be available at the same time along with the TIP.	To be physically checked by the BOO.
	IMAGE LIBRARY	
03	The image library should have an image library containing at least 100 explosives devices, 100 knives and 100 firearms in various sizes, shapes, locations and orientations. However, the system shall have facility to expand the library to incorporate additional images by user without assistance of the manufacture.	To be physically checked by the BOO.
04	The image library should contain images of threats at different orientations both plan and end on orientation should be used. Although these will be assigned different file names and references, it must be possible to cross-reference these as the same threat. All threat image Projection images must be realistic, representative and non distinguishable from real threat items.	To be physically checked by the BOO.
	TIME INTERVAL	
05	Programming facility shall be available to project threat images in different intervals. The time period for threat image as well as image mix in percentage shall be user programmable e.g. software shall select 40% images of explosive devices, 35% of fire arms & 25% knives or random etc.	To be physically checked by the BOO.
06	Once the screener has responded to identify the computer generated threat image, it should remain on the screen for a predefined user	To be physically checked by the BOO.

Sl.	Revised Technical Specifications	Trial Directives
	programmatic feedback message shall be visible to the screener.	
	SYSTEM ADMINISTRATION	
07	The threat image projection facility shall have details of user data-base such as Department name, screener name, Organization, User ID Number, level of access such screener, administrator, Maintenance & Password etc.	To be physically checked by the BOO.
08	Access to start up menu should be restricted only to the authorized individuals. A log-in procedure by means of Password" or "Security Key" could achieve restricted access to each of the comment. The log-in procedure should not take longer than 20 seconds. The system should have facility to by pass the TIP facility, if programmed so by the system administrator. It is to be ensured that the TIP software shall not be hindrance to normal functioning of x-ray machines.	To be physically checked by the BOO.
09.	When the operator logs-in or logs-out message should be displayed on x-ray BIS VDU Screen to confirm that the/she has been correctly logged-in or logged-out.	To be physically checked by the BOO.
	FEED BACK REPORT	
10	The threat image Projection should be capable of giving feedback "HIT,MISS or FALSE ALARM" message. No message will be presented if a screener correctly passed as clear bag.	To be physically checked by the BOO.
11.	A "HIT" message to be presented when a screener has correctly identified a Threat image Projection Image. A "MISS" : message shall be presented when screener fails to identify the TIP image. A "False Alarm" message shall be given when screener incorrectly indicate TIP image when in fact no threat image projection is present. The feedback should clearly indicate in a screen that a tip object has been correctly identified/tip object has been missed/ that a TIP object has been missed/no TIP object was present. Information should be recorded in the database.	To be physically checked by the BOO.
12.	Different colour coding shall be used for feedback to the Screener., It is recommended that colour code "Red for MISS" Green for " HIT" and Yellow to False Alarm or interrupt" be used.	To be physically checked by the BOO.
13.	The system shall automatically prepare the daily log of events for each	To be physically checked by the BOO.

Sl.	Revised Technical Specifications	Trial Directives
	shift and for each Screener performance. TIP log shall include particulars of Name of Screener, Time & date of threat image, weather threat image was successfully identified or missed etc.	
14.	The report on Threat Image Projection system may have date and time (From - to) as per requirement. Screener particulars, and decision/out come i.e. MISS, HIT or False Alarm in percentage as well in absolute numbers, numbers of bags screened, categories such as explosives devices knife or weapon etc.	To be physically checked by the BOO.
15.	As a standard practice, daily/weekly /monthly report shall be retrieved. Report shall be for any given time and period, as per command.	To be physically checked by the BOO.
16.	All data should be stored on the system for a minimum of two months after it has been down loaded. No individual, regardless of access rights to the Threat Image Projection components would delete or amend any of threat image Projection data or time i.e. Threat Image Projection data on the actual X-ray machine will be read only file.	To be physically checked by the BOO.

(B C Joshi), DIG, SIW BSF

(Rajesh Ekka), Dy Dir DCPW

(Rabish Chandra), DC BSF

(R K Meel), Dy Comdt CISF

(Satvinder Singh), AC ITBP

(A K Shukla), AC, CISF

(G Bajan), Insp (Comn) SSB

(Rahul Kumar), ASI/RM SIW BSF

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(K K SHARMA) IPS
DIRECTOR GENERAL
BORDER SECURITY FORCE