



## Block Proving with Axle Counter Using Block Panel & UFSBI (as per IRS: S-105/2012 Ver.0)

(Relay-less EBLM Version)



*Absolute Block Working using  
Tokenless-Push Button Type Block  
Instrument as per RDSO Spec.  
IRS:S-105/2012 Ver-0 (both  
Solid-State Version) on Quad  
Cable, OFC or Wireless Media*

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An ISO 9001:2015 Company

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## System Features

- It is a non-co-operative, user-friendly push button type Block Instrument.
- The unique design of interlocking circuits and input/outputs through Hot-Standby SIL-4 Electronic Block Logic Module (EBLM) with Hot-Swap ability and diagnostic alarms, to inform the maintainer about single unit failure.
- This enables the system to operate relentlessly even if one of the EBLM unit is non-functional.
- Optical & Galvanic Isolation making the system usable in both RE & Non-RE sections.
- The automatic TOL and LINE CLOSED features considerably reduces the operational time.
- The use of UFSBI with Automatic Media Changeover Facility additionally harnesses the true benefits of using dual SSDAC / MSDAC / HA-SSDAC.
- The digital signal transmission takes care of noise disruptions generally encountered in the transmission system. It ensures safety of operation against these noises by use of fail-safe data structure, message redundancy etc.
- Provision high availability option is possible wherein redundant logic modules and Dual UFSBI units can provide can guarantee 100% system fault free operation.
- The Relay based Block Instrument can be easily converted in the Solid State by just replacing the relay logic with Hot-Standby EBLM

## Futuristic Provisions

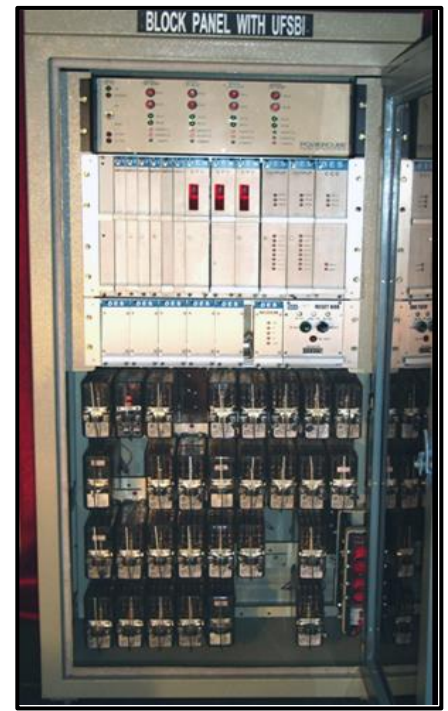
*Similar EBLM units can be configured for other predominantly fixed logic applications such as Auto Signalling and IB Signalling wherein EBLM units combined with RDSO approved Vital-Mux, UFSBI may prove to be a good low-cost replacement of Relay based interlocking circuits in ABS / IBS. It may be envisaged depending on the success of the product.*



Double Line Block Panel



Single Line Block Panel

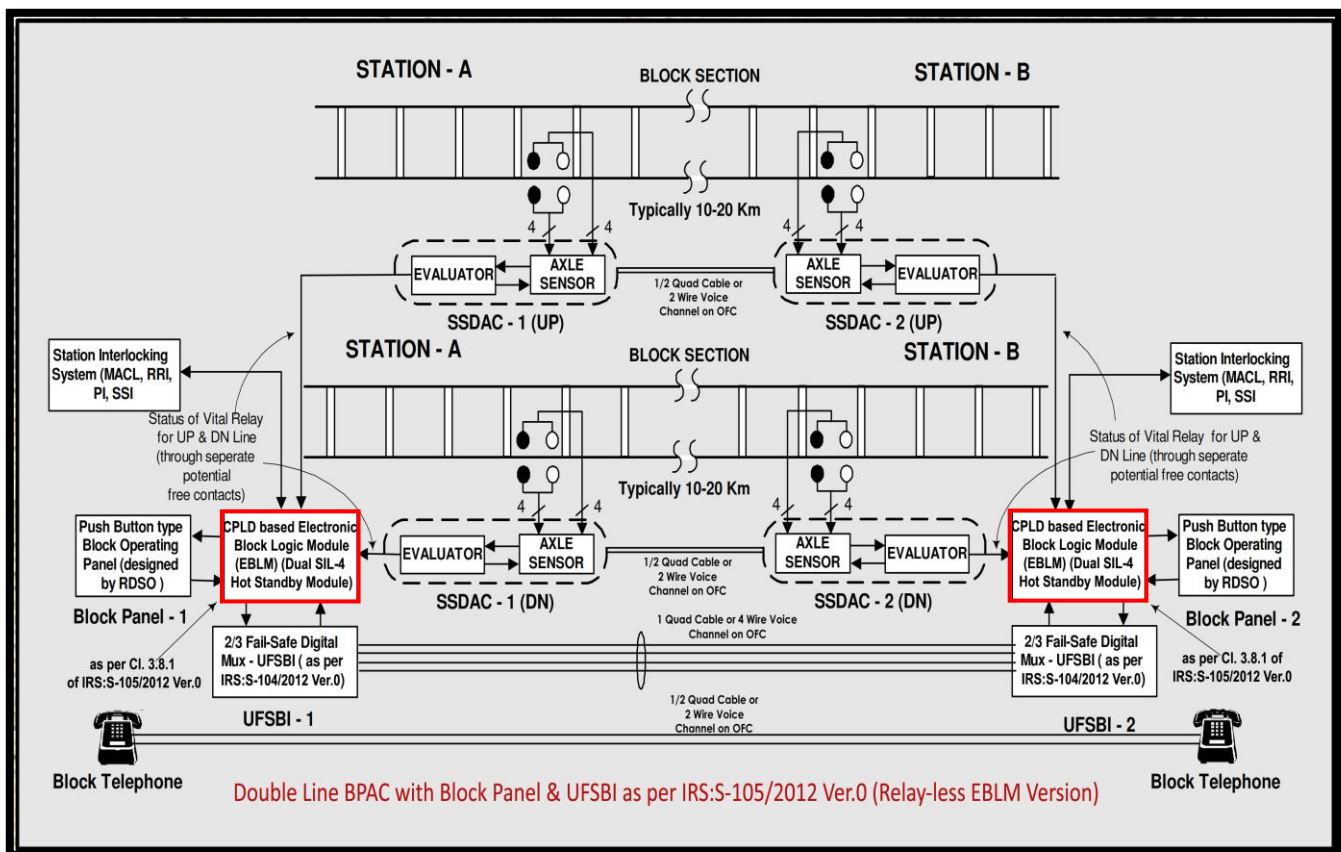
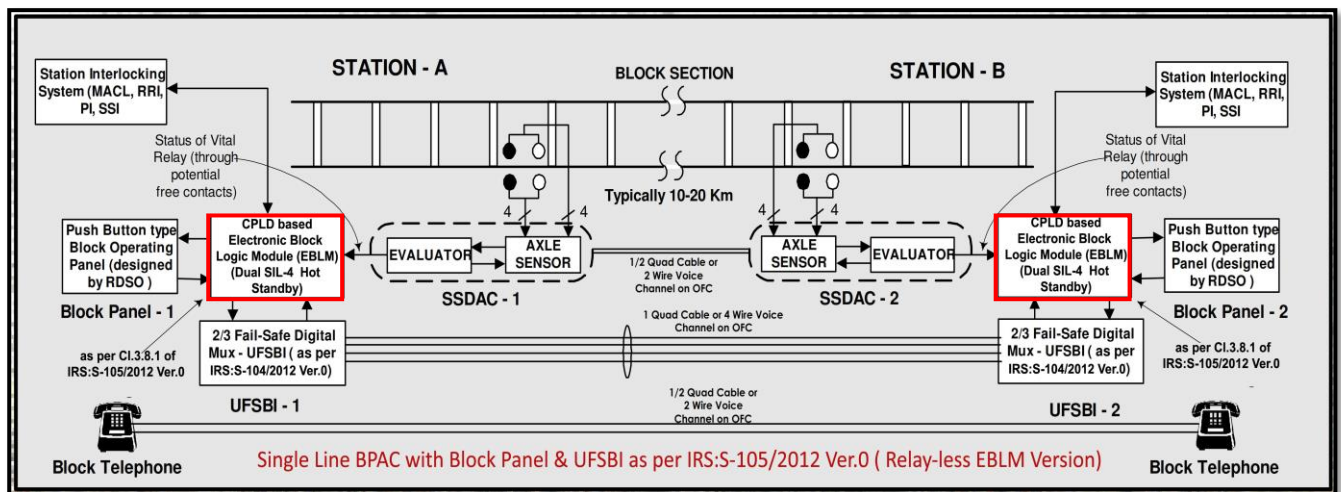


Block Panel with UFSBI (as per IRS:S-105/2012 Ver.0) with Relays



Block Panel with UFSBI (as per IRS: S-105/2012 Ver.0) with Dual EBLM

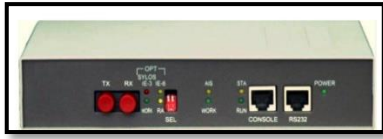
## Block Working Schemes with EBLM:



### Operational Benefits of EBLM based Block Panel with UFSBI over Q-Series Relay Version

- Fit for Both RE and Non-RE areas.
- Automatic TOL – block failure due to premature TOL operation or operator errors are eliminated.
- Automatic Line Close – Elimination of operator involvement results in time saving and immediate block closure. Block closing provision after push back operation, avoids block failure for following train
- Audio-visual alarms on section occupancy and clearance.
- There is no block length limitation as equipment supports Wireless, E1 (2 Mbps) Channel, or dark OFC.
- Simultaneous operation on 2 (two) media with Automatic Media Changeover and Backup Modem for secondary media
- Separate industrial grade modem arrangements for E1 (2 Mbps) Channel, dark OFC available or Wireless (2.4 / 5.8 GHz) Modems available for suitable media interface

## Modems for Block working with UFSBI & Tentative Scheme



E1 (2 Mbps) to RS232



Wireless (2.4 / 5.8 GHz) to RS232 & Ethernet  
Upto 20 Km on LOS (Front)



Single Mode OFC to E1 & RS232  
(20 Km typically upto 80 Km)



Wireless (2.4 / 5.8 GHz) to RS232 & Ethernet  
Upto 20 Km on LOS (Back)



High Gain Grid Antenna for  
Wireless Modem

### Maintenance Benefits

- No periodic over hauling since there are no mechanical parts.
- Only 5 nos. Q-series relays per unit through use of EBLM, for improved reliability.
- Instrument can work on OFC, Wireless and Quad media without any alteration of block equipment when medium is changed.
- Hot-Standby EBLM ensures 100% redundancy in Block Logic Unit and continues normal operation, even when 1 (one) of the 2 (two) unit is in failed state. This feature is unique to the version of equipment with EBLM.
- Status detection TGTR, TCFR, ASCR & UFSBI Health Relays and through integration with datalogger.
- Error code displayed numerically for ease of understanding.
- Status of all Relays / EBLM states indicated by LED for easy fault finding thus reduces MTTR
- Diagnostic LED indications provided on the PCB facia makes troubleshooting easy

### Safety Features

- Fail-Safe Mux UFSBI having 2 out of 3 architectures, is entrusted with the responsibility for exchange of Vital relay states pertaining to block operations ensuring Fail-Safety (SIL-4) and High Availability
- In the Relay based version of the Block Instrument RDSO based relay circuit proven in more than 1500 working installation ensures reliable and safe operation
- In the EBLM based version of the Block Instrument dual 2 out of 2, SIL-4 EBLM units deliver high availability with maximum safety.
- Bi- state and de-bounce validations for inputs with > 1 KV optical isolation
- Independent 2 out of 3 Architectural Voter card for placing validated outputs of Fail-Safe Mux UFSBI
- Critical Power Control modules using dual health check relays and electronic supervisory circuits for ensuring safe shutdown.
- Fail-Safe Q-series Latching relay for holding back the TGTR and TCFR state, even under power or equipment failure for operation

**Comparison of different Functionally Equivalent Axle Counter based Block Panel Instruments**

| COMPARISON BASIS                                                                           | BPAC USING UFSBI WITH RELAYS<br>(as per IRS: S-105/2012 Ver.0)                                                 | BPAC USING UFSBI WITH EBLM<br>(as per Cl. 3.8.1 of IRS: S-105/2012 Ver.0)                                                             | SSBPAC<br>(RDSO/SPN/175/2005)                                                                   |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Interlocking logic<br>Resolving architecture                                               | Using Q- series relays                                                                                         | Using 2 out of 2 CPLD based Hardware Logic with <b>Hot-Standby &amp; Hot-Swapability</b>                                              | Using 2 out of 3 Microprocessor without Hot-Standby                                             |
| Inter-Station<br>Communication                                                             | Using 16 I/O (SIL-4) Fail-Safe Mux UFSBI                                                                       | Using 16 I/O (SIL-4) Fail-Safe Mux UFSBI                                                                                              | Inbuilt Fail-Safe (SIL-4) Communication                                                         |
| Redundancy                                                                                 | Communication: 2 out of 3 UFSBI with Auto Media C/O (Quad / OFC)<br>Logic: Standalone (no contact paralleling) | Communication: 2 out of 3 UFSBI with Auto Media C/O (Quad / OFC)<br><b>Logic: (2 out of 2) x 2 Hot-Standby &amp; Hot-Swap ability</b> | Communication: 2 out of 3 Block Logic: 2 out of 3                                               |
| Safety Validation                                                                          | Communication: SIL – 4<br>Logic: Q-series Relays (RDSO design)                                                 | Communication : SIL – 4<br><b>Logic: SIL – 4 (based on RDSO design)</b>                                                               | Communication: SIL – 4<br>Logic: SIL – 4                                                        |
| No. of Q-Series Relays                                                                     | 29 for Double Line<br>31 for Single Line                                                                       | <b>5 for Double Line</b><br><b>5 for Single Line</b>                                                                                  | 9 for Double Line<br>9 for Single Line                                                          |
| Power requirement                                                                          | 24 Volts DC / 5 Amp                                                                                            | 24 Volts DC / 4 Amp (with redundancy)                                                                                                 | 24 Volts DC / 5 Amp                                                                             |
| Spare Communication<br>channel Availability                                                | 9 Fail-Safe Relay State can be exchanged in each direction                                                     | <b>9 additional Fail-Safe Relay State can be exchanged in each direction</b>                                                          | 2 Fail-Safe Relay State can be exchanged in each direction                                      |
| Functionality                                                                              | Dedicated for Absolute block operation                                                                         | Dedicated for Absolute block operation                                                                                                | Dedicated for Absolute block operation                                                          |
| Backward compatibility<br>with existing BPAC with UFSBI using Relays                       | Not Applicable                                                                                                 | Yes, 100% across makes of RDSO approved Fail-Safe Mux UFSBI                                                                           | No<br>Old Block Instrument shall have to be fully cannibalized and replaced with the new SSBPAC |
| Cost of New Installation                                                                   | Rs.7,35,000/- Per Pair (approx.)                                                                               | Rs. 6,50,000/- Per Pair (approx.)                                                                                                     | Rs. 9,50,000/- Per Pair (approx.)                                                               |
| Cost of Up gradation<br>from fully Relay based system to less Relay Version ( to Railways) | Not Applicable                                                                                                 | Effectively NIL<br>(Cost of EBLM Modules is 10-15% lower than the cost of Relays released)                                            | Rs. 16,85,000/- Per Pair<br>(Cost of Relay based System Replaced + Cost of New SSBPAC)          |

*# Prices are indicative and mentioned for comparison only. It may change slightly. Therefore, must not be considered as quotation.*

**Installations of Block Panel with UFSBI (as per IRS:S-105/2012 Ver.0) using Q-Series Relays**



Relay Room



Station Master Room



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