

LYNK RV-C Interface

Technical Reference Manual

REV.	REVISION DATE	DESCRIPTION OF CHANGE
A	2022-05-27	Initial Release of Technical Reference Manual
B	2023-10-23	Corporate identity updated.

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1. Introduction	2
1.1 Purpose	2
1.2 Audience	2
2. References	2
2.1 Terms and Definitions	2
3. Notation	2
4. Integrations	3
4.1 Baud Rate	3
4.2 Source Address	3
4.3 Device Instance	3
4.4 Multi-Packet Messages (0xECFF)	4
4.4.1 Initial Packet	4
4.4.2 Subsequent Packet	4
5. DGN Listing	4
5.1 Acknowledgement (0xE8xx)	4
5.2 DM_RV (0x1FECA)	5
5.2.1 FMI	6
5.2.2 Common SPN	6
5.3 PRODUCT_IDENTIFICATION (0xFEEB)	7
5.4 DC_SOURCE_STATUS_1 (0x1FFFD)	7
5.5 DC_SOURCE_STATUS_2 (0x1FFFC)	8
5.6 DC_SOURCE_STATUS_3 (0x1FFFB)	8
5.7 DC_SOURCE_STATUS_4 (0x1FEC9)	9
5.8 DC_SOURCE_STATUS_6 (0x1FEC7)	10
5.9 DC_SOURCE_STATUS_11 (0x1FEA5)	11
5.10 DC_SOURCE_COMMAND (0x1FEA4)	12
5.11 Received Messages	12



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800-0012 REV B

1. Introduction

1.1 Purpose

This interface technical reference document is designed to detail Discover's implementation of RV-C and provide a quick reference guide for interfacing with RV-C enabled Discover Battery devices.

1.2 Audience

This document is intended for the use of engineers both internal and external to Discover Battery who intend to interface with Discover products through the RV-C protocol. It is expected that the audience has a working knowledge of the CAN physical layer as well as the RV-C application layer. If you are inexperienced in this topic Discover Recommends that you seek help from experienced personnel.

2. References

2.1 Terms and Definitions

TERM	DEFINITION
Battery Bank	Statistics and values that represent a summary of all battery packs connected.
Battery Pack	Individual battery pack data
BMS	Battery Management System
LSB	Least Significant Byte
MSB	Most Significant Byte
VPC	Volts per cell module

3. Notation

FORMAT	MEANING
0x	Hexadecimal (base 16) values are prefixed with "0x"
0b	Binary (base 2) values are prefixed with "0b"

All arrays are referenced via an index range from 0 to length -1 (as opposed to 1 to length), unless otherwise stated. When referencing bits within a byte, the most significant bit is labelled bit7, the least significant bit0.



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MSB							LSB
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0

DESCRIPTION	RANGE	SIZE	TYPE	VALUE DEFINITION
Bit field	0 to 1	2 bit	uint2	11b – Data not available 10b – Error 01b – On 00b – Off
Character	1 to 253	1 byte	char	255 – Data not available 254 – Out of range 0 – Reserved
Integer, 16 bit unsigned	0 to 65532	2 byte	uint16	65535 – Data not available 65534 – Out of range 65533 – Reserve
Integer, 32 bit unsigned	0 to 4294967292	4 byte	uint32	4294967295 – Data not available 4294967294 – Out of range 4294967293 – Reserved
Integer, 8 bit unsigned	0 to 252	1 byte	uint8	255 – Data not available 254 – Out of range 253 – Reserved

4. Integrations

4.1 Baud Rate

The data rate is 250 kbit/s.

4.2 Source Address

PRODUCT	DEFAULT SOURCE ADDRESS	DYNAMIC ADDRESS RANGE
Battery	0x46	0x80 - 0x8F

4.3 Device Instance

VALUE	DESCRIPTION
0	Invalid
1	Main House Battery Bank
2	Chassis Start Battery
3	Secondary House Battery Bank
4	Generator Starter Battery
5 - 250	Other instances in the RV.



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4.4 Multi-Packet Messages (0xECFF)

The multi-packet messages are used for messages longer than 8 bytes.

4.4.1 Initial Packet

BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	Reserved - Always 0x20
1 - 2	16	uint16	Message Length (bytes)
3	8	uint8	Packet Count
5	8	uint8	DGNTransmitted (LSB)
6	8	uint8	DGNTransmitted (ISB)
7	8	uint8	DGNTransmitted (MSB)

4.4.2 Subsequent Packet

BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	Packet Number
1 - 7	56	uint16	Data

5. DGN Listing

5.1 Acknowledgement (0xE8xx)

xx = destination address

Transmission Rate	As Needed
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	Acknowledgment Code
1	8	uint8	Instance
2	0 - 3	uint4	Instance Bank (if multi-banked)
2	4 - 7	N/A	Reserved
3	8	N/A	Reserved
4	8	uint8	Source Address
5 - 7	24	uint24	DGN Acknowledged



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Standard Acknowledgments

VALUE	DESCRIPTION
0	ACK. Command will be executed.
1	NAK. Command will not be executed.
2	Command is not acceptable from the source.
3	Conditions do not allow command to be executed.
4	Command is not formatted properly.
5	Command parameters are out of range.
6	Command requires a security password.
7	Command requires more time to execute. This should be followed by an ACK when complete.
9 to 127	Reserved
128 to 254	Command-specific responses.

5.2 DM_RV (0x1FECA)

Transmission Rate	5000 ms if no fault 1000 ms for fault conditions
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	0 - 1	uint2	Operating status 01b - Device is on
0	2 - 3	uint2	Operating status 00b - Device is in standby 0ab - Device is active
0	4 - 5	uint2	Yellow Lamp status
0	6 - 7	uint2	Red Lamp status
1	8	uint8	DSA
2	8	uint8	SPN-MSB
3	8	uint8	SPN-ISB
4	0 - 4	uint5	SPN-LSB
4	5 - 7	uint3	Failure Mode Identifier
5	0 - 6	uint7	Occurrence count
5	bit 7	N/A	Reserved
6	8	uint8	DSA Extension 0xFF - No DSA Extension Defined
7	0 - 3	uint4	Bank Select 0 - 13 when Bank Selection is supported 0xF - When Bank Selection is not supported
7	4 - 7	N/A	Reserved



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5.2.1 FMI

Value Description

- 0 Datum value above normal range
- 1 Datum value below normal range
- 2 Datum value erratic or invalid
- 3 Short circuit to high voltage (or complete sensor input failure)
- 4 Short circuit to low voltage (or complete sensor input failure)
- 5 Open circuit, or output current below normal
- 6 Grounded circuit, or output current above normal
- 7 Mechanical device not responding
- 8 Datum value showing error of frequency, pulse width, or period
- 9 Datum not updating at proper rate
- 10 Datum value fluctuating at abnormal rate
- 11 Failure not identifiable
- 12 Bad intelligent RV-C node
- 13 Calibration required
- 14 "None of the above" (use sparingly!)
- 15 Datum valid but above normal operational range (least severe)
- 16 Datum valid but above normal operational range (moderately severe)
- 17 Datum valid but below normal operational range (least severe)
- 18 Datum valid but below normal operational range (moderately severe)
- 19 Received invalid network datum
- 20 Network Device Not Responding
- 21 Networked Device Not Responding (failure due to the unresponsiveness of a second networked device)
- 22 Reverse polarity
- 23 to 30 Reserved
- 31 Failure mode not available

5.2.2 Common SPN

Value Description

- 0 Specific Point Unknown
- 1 Node Microprocessor (or ECM)
- 2 Node Analog-Digital Converter
- 3 Node Settings or Configuration
- 4 Node RAM
- 5 Node Power Supply
- 6 Node Temperature



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7 Node Clock /Timer

8 Node Date /Time. Usually indicates a product that requires a clock DGN from another source.

9 Node RV-C Connection. Usually indicates a product that requires a specific DGN from another source.

10 Node Serial/ID Number

11 Node Processor Supervisor (Watchdog)

12 Node Firmware

13 Node Internal Subnetwork Communications.

5.3 PRODUCT_IDENTIFICATION (0xFEED)

Transmission Rate	On Request
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This is a Multi-packet Message.

Data is delimited by "*"

Field 1: Discover

Field 2: LYNK II -02 or LYNK LITE - 03

Field 3: Serial Number

Field 4: Note used.

Example: Discover*LYNK II-02*DERLK02220010001*

5.4 DC_SOURCE_STATUS_1 (0x1FFFD)

Transmission Rate	500 ms
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2-3	16	uint16 (0.050 V)	DC Voltage [0 V, 3212.5 V]
3-7	32	uint32 (0.001 A)	Battery Nominal Capacity 0 A Offset = 0x77359400 [-2000000.000A, 2221081.200A]



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5.5 DC_SOURCE_STATUS_2 (0x1FFFC)

Transmission Rate	500 ms
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2-3	16	uint16 (0.03125 °C)	Temperature [-273 degC, 1735 degC]
4	8	uint8 (0.5%)	State of Charge [0 %, 125 %]
5-6	16	uint16 (minutes)	Time Remaining
7	0-1	uint2	Time Remaining Interpretation 00b = Time to Empty. 01b = Time to Full. 11b = Time to Empty.

5.6 DC_SOURCE_STATUS_3 (0x1FFFB)

Transmission Rate	500 ms
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2	8	uint8 (0.5 %)	State of Health [0 %, 125 %]
3-4	16	uint16 (1 Ah)	Capacity Remaining [0, 65530 Ah]
5	8	uint8 (0.5 %)	Relative Capacity [0 %, 125 %]
6-7	16	uint16 (1 mV)	AC RMS Ripple [0 mV, 65530 mV]



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5.7 DC_SOURCE_STATUS_4 (0x1FEC9)

Transmission Rate	500 ms On Change
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2	8	uint8	Desired Charge State 0 - Undefined, charge source decides 1 - Do not charge 2 - Bulk 3 - Absorption 4 - Overcharge 5 - Equalize 6 - Float 7 - Constant Voltage / Current
3 - 4	16	uint16 (0.05 V)	Desired DC Voltage [0 V, 3212.5 V]
5-6	16	uint16 (0.05 A)	Desired DC Current 0 A Offset = 0x7D00 [-1600 A, 1612.5 A]
7	0-3	uint4	Battery Type 3 - Lithium Iron Phosphate



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5.8 DC_SOURCE_STATUS_6 (0x1FEC7)

Transmission Rate	500 ms On Change
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2	0 - 1	uint2	High Voltage Limit Status 00b - Not reached 01b - Limit reached
2	2 - 3	uint2	High Voltage Disconnect Status 00b - Connected 01b - Charge bus disconnected
2	4 - 5	uint2	Low Voltage Limit Status 00b - Not reached 01b - Limit reached
2	6 - 7	uint2	Low Voltage Disconnect Status 00b - Connected 01b - Load bus disconnected
3	0 - 1	uint2	Low state of charge limit status 00b - Not reached 01b - Limit reached
3	2 - 3	uint2	Low state of charge disconnect status 00b - Connected 01b - Load bus disconnected
3	4 - 5	uint2	Low DC source temperature limit status 00b - Not reached 01b - Limit reached
3	6 - 7	uint2	Low DC source temperature disconnect status 00b - Connected 01b - Charge or load bus disconnected
4	0 - 1	uint2	High DC source temperature limit status 00b - Not reached 01b - Limit reached
4	2 - 3	uint2	High DC source temperature disconnect status 00b - Connected 01b - Charge or load bus disconnected



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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
4	4 - 5	uint2	High Current DC Source Limit 00b - Not reached 01b - Limit reached
4	6 - 7	uint2	High Current DC Source Disconnect 00b - Connected 01b - Charge or load bus disconnected
5-7	24		Reserved

5.9 DC_SOURCE_STATUS_11 (0x1FEA5)

Transmission Rate	500 ms
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BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	8	uint8	Device Priority 120 - Battery SOC / BMS Device
2	0 - 1	uint2	Discharge On/Off Status 00b = Discharge Bus disconnected. 01b = Discharge Bus connected.
2	2 - 3	uint2	Charge On/Off Status 00b = Charge Bus disconnected 01b = Charge Bus connected.
2	4 - 5	uint2	Charge Detected 00b = No charge detected. 01b = Charge detected.
2	6 - 7	uint2	Reserve Status 00b = Battery charge is above the reserve level. 01b = Battery charge is at or below reserve level.
3-4	16	uint16 (1 Ah)	Full Rated Capacity [0 Ah, 65530 Ah]
5-6	16	uint16 (1 W)	DC Power [0 W, 65530 W] Consult current value in DC_SOURCE_STATUS_1 to determine if power is charge or discharge.

5.10 DC_SOURCE_COMMAND (0x1FEA4)

Transmission Rate	On Request
ACK Requirements	ACK Always

BYTE	FIELD LENGTH (BITS)	FIELD TYPE	FIELD DESCRIPTION
0	8	uint8	DC Instance 1 - Main House Bank 3 - Secondary House Battery Bank 5-250 - Other Instances
1	0 - 1	uint8	Desired Power On/Off Status 00b = Disconnect Battery main power switch / contactor. 01b = Connect Battery main power switch / contactor. 11b = Do not change status
1	0 - 2		Desired Charge On/Off Status 00b = Disconnect Charge Bus switch / contactor.
2 - 7		N/A	Reserved

5.11 Received Messages

DGN NAME	DGN NUMBER	TRANSMISSION RATE	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
PGN_REQUEST	0xEAxx	N/A	Requested DGN							



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