



Digi-Star ISOBUS / CAN Application Notes

Document D4000

Communication Interface REVISED for the
Scale Link 2000 Series of ISOBUS Scale Products
(SL2110-ISO & SL2140-ISO)

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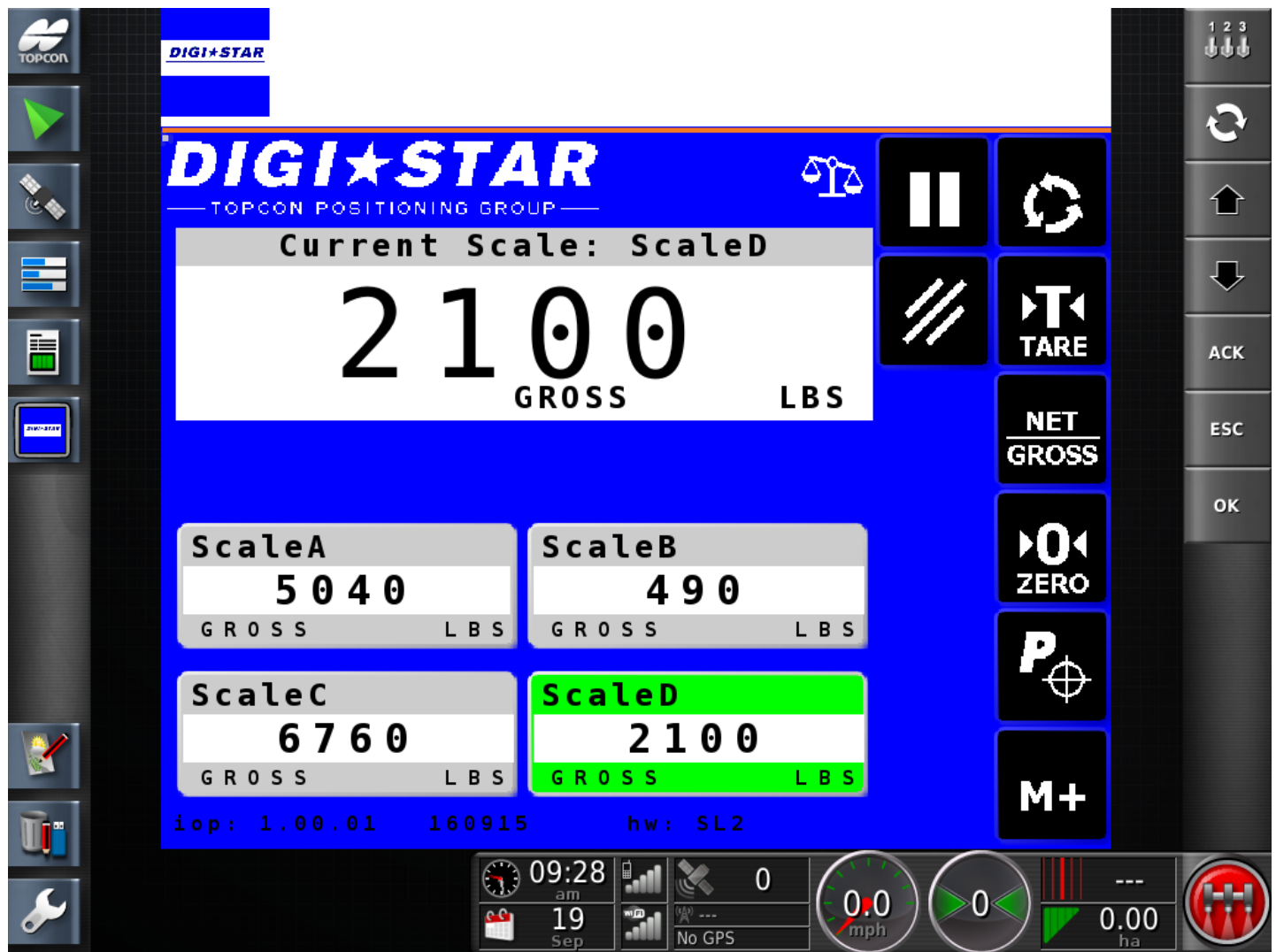
Document Revisions

Revision History			
Revision:	Date:	By:	Description:
Original	20 Aug 2010	cty	Original.
A	5 Oct 2010	JAB	Make into a generic document.
B	07 Oct 2010	cty	Updated screen shots.
C	07 Oct 2010	cty	Updated screen shots.
D	01 Dec 2010	JAB	Add CAN references.
E	04 Jan 2011	JAB	Add Virtual Terminal Screen.
F	12 Jan 2011	JAB	Clarify A, B, C Scale Identifier.
G	18 Jan 2011	JAB	Include Tare & other Commands.
H	04 Feb 2011	RDB	Description corrections and clarify starting PS/DA Add commands
I	09 Feb 2011	RDB	Added documentation for A,B,C scale Gk weight request. Added additional content to clarify Message Formats.
J	07 Mar 2011	RDB	Added ABC scale select scale platform documentation. Clarified ACK/NAK messaging.
K	06 May 2011	RDB	Added Documentation for Disable/Enable Weight Broadcast GkD & GkE. fixed a couple document J errors.
L	5 Dec 2011	RDB	Added GY GZ and associated messages
M	7 Apr 2014	JPF	Added ISOBUS DDI support information; document # D4000
N	19 Sep 2016	JPF	Revision for SL2
O	07 Oct 2016	JPF	Typo corrections and added info regarding SL1 series ISOName / Address claim data (Ind. Grp/Dev CI/Func Type)
P	22 Dec 2016	JPF	Corrected DDI values in examples for getting SETUP and CAL values from the SL2. Additional format/layout changes for clarity.
Q	23 Aug 2017	JPF	Added vendor-specific DDI values and message examples for additional troubleshooting support: Low Battery, Invalid Date, No ISOBUS Mask/IOP loaded in SL2
R	05 Oct 2017	JPF	DAN 8798 function on SL2 change to DAN 8746 (ISONAM) Updated sections on Getting SETUP and CAL values to include description of requesting a specific-scale's value and how to request the value for the currently selected scale. (requires SL2 SW version 17MR28 or newer)
S	09 Jul 2018	JPF	Add scale status/error/warning condition CAN message info section. Added DAN code set/get over CAN message section. Some typo and format changes.

*** NOTE: As of Revision N, this document focuses on the second generation of Digi-Star Scale Link devices (SL2110-ISO / SL2140-ISO family of scales)

The Default Universal/Virtual Terminal Display of Digi-Star SL2xxx-ISO Scales:

For tractors equipped with ISOBUS, the Digi-Star SL2 scale will display the weight on the virtual terminal in the cab. This screen also allows the operator to perform scale functions such as zero/balance, tare, and setup. The general appearance of the display is shown.



Address Claim from SL2xxx-ISO Scale:

The Digi-Star SL2xxx-ISO scale reports the following in its' Address Claim / ISOName data:

Example:

CAN-ID	LENGTH	DATA
0x18EEFF90	8	0xA4 0x09 0xA0 0x2D 0x00 0x95 0x00 0x80 <ul style="list-style-type: none">• Arbitrary Address Claim Capable• Industry Group 0 (Global)• Device Class 0 (Non-Specific)• Function Type 149 (0x95) – BIN Weighing• Function Instance 0• ECU Instance 0• Manufacturer Code 365 (0x16D) – Digi-Star

NOTE: SL1 series had different values for Industry Group, Device Class, and Function Type
SL1xx reported Industry Group 2 (Ag), Device Class 17 (11h, Sensor), Function Type 0 (Engine)

The Direct Access Number(DAN) 8746 can be used to configure the SL2 to use the “SL1” or “SL2” ISOName field values. This is to allow direct replacement of an SL1 with an SL2 in systems that check additional fields within the ISOName when identifying a Scale Link on the ISOBUS.

Reading the Gross weight from a Digi-Star SL2xxx-ISO Scale:

The Digi-Star SL2xxx-ISO scale turns on and will start sending out the Gross weight in grams over the ISOBUS / CAN. The Gross weight message broadcast time is based on the MENU 2 ISO WT (DAN2701) setting, which can be varied between 0.0(off) and 2 seconds in 0.1 second steps.

After your ECU has turned ON and has finished the ISOBUS address claim, it can then read the Gross weight being broadcast by the Digi-Star SL2xxx-ISO. If there are no other devices with higher priority, the default address SL2xxx-ISO will claim is SA 0x90 (144 decimal). The default base address the SL will claim can be changed via the MENU 2 ISOADR setting (DAN2702). If address contention occurred with other devices attempting to claim the same address, the SL2xxx-ISO will negotiate, per ISOBUS protocol, and may move to a different address then configured.

The Gross weight is sent using the process data message format defined in ISO 11783-7 with PGN 0xCB00, global destination address 0xFF, and priority 3. The MENU 2 ISODDI (DAN2704) setting controls which DDI values are used when sending the weight messages onto ISOBUS.

PGN: CB00h

Example:

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x13 0x00 0xE8 0x00 0x81 0x9C 0x4A 0x00

Weight is 0x004A9C81 (4889729 decimal) grams or ~ 4889.7 kg = 10780 lbs.

Note: To convert the weight from grams to pounds, 1000 grams = 1kg = 2.2046 lbs.

Byte	Value <i>DDION</i>	Parameter Name	Description	Value <i>DDIOFF</i>
1	0x13	Scale/Command	Upper nibble = Scale Identifier (1=Scale A, 2=Scale B, 3=Scale C, 4=Scale D) Lower nibble = Command (0x3)	
2	0x00	Empty		
3	0xE8	Gross Weight	Code for "Gross" weight (DDI-232) (lsb)	<i>0x4B 'K'</i>
4	0x00	"	" (msb)	
5		Weight	Value in grams (lsb)	
6		"	"	
7		"	"	
8		"	" (msb)	

Note that the weight is sent in reverse byte order (little endian).

Reading the SERIAL-Gross weight from a Digi-Star SL2xxx-ISO Scale:

If enabled the SL2xxx-ISO scale will also send out the SERIAL-Gross weight in grams over the ISOBUS / CAN for EACH scale platform at the same interval controlled by the ISO WT (DAN2701) setting. Sending of Serial Gross weight CAN messages can be enabled/disabled on the System Setup mask page, or via DAN 2706.

Example: SERIAL-Gross weight broadcast (vendor specific DDI: 57400 (0xE038))

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x13 0x00 0x38 0xE0 0x81 0x9C 0x4A 0x00

Reading the SUMMED weight from a Digi-Star SL2140-ISO Scale:

If the “Sum Weight Mode” of the SL2140-ISO quad scale is set to TOTAL or COMBINED, the summed GROSS weights and the summed NET weights of all scale platforms can be broadcast in **grams** over the ISOBUS / CAN at the same interval controlled by the ISO WT (DAN2701) setting. Enable/disable of sending the summed weight is done via a checkbox on the System Setup screen that appears when the Sum Weight Mode is set to TOTOAL or COMBINED. The SUMMED weight broadcast messages will appear on the ISOBUS as scale #5. The summed weights will be sent using the following vendor-specific DDI values:

Example: **SUMMED GROSS** weight broadcast **vendor specific DDI: 57503 (0xE09F)**

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x53 0x00 0x9F 0xE0 0x81 0x9C 0x4A 0x00

Example: **SUMMED NET** weight broadcast **vendor specific DDI: 57500 (0xE09C)**

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x53 0x00 0x9C 0xE0 0x00 0x00 0x00 0x00

Sending commands to the Digi-Star SL2xxx-ISO Scale:

Digi-Star legacy style Escape Computer Commands can be sent to the scale using the Proprietary A message format defined in J1939. For this format, the PGN is 0xEF00 and priority is 6.

NOTE: beginning with software release version/date code, 180705, additional message options have been added to allow broader configuration of SL2 settings using CAN messages. See the section below entitled [“Changing SL2 settings \(DAN code\) via CAN messages”](#)

To Zero / Balance the Scale:

Prior to loading the system, “Zero/Balance” the scale by sending the following ISOBUS / CAN message to the Digi-Star SL2 scale:

(note: on a multi-scale SL2x40, this will zero-balance the currently selected scale)

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.
Data length: 8 bytes.

Example:

CAN-ID	LENGTH	DATA	“G”	“B”
0x18EF90EE	8	0x41 0xFF 0xFF 0xFF 0xFF 0x47 0x42 0xC6		

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0xFF	Command Value		Command value
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“
6	0x47	Command	‘G’	Command (general command)
7	0x42	“	‘B’	SubCommand (Balance Indicator)
8	0xC6	Checksum		Checksum

1. The scale will Zero/Balance the system to 0 lbs/kgs and enter the Gross weighing mode.
2. The Gross weight continues to be broadcast by the Digi-Star SL2xxx-ISO.

Example:

CAN-ID	LENGTH	DATA (DDI ON)
0xCCBFF90	8	0x13 0x00 0xE8 0x00 0x00 0x00 0x00 0x00

The weight is now 0.

To Tare and send out the Net weight from the Digi-Star SL2xxx-ISO Scale:

The TARE/NET command:

(note: on a multi-scale SL2x40, this will tare the currently selected scale)

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.

Data length: 8 bytes.

Example: TARE Command

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0xFF 0xFF 0xFF 0xFF 0x47 0x54 0xD8

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0xFF	Command Value		Command value
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“
6	0x47	Command	‘G’	Command (general command)
7	0x54	“	‘T’	SubCommand (Conduct tare and go to Net weight mode)
8	0xD8	Checksum		Checksum

1. The scale Tares the system to 0 lbs/kgs and enters the Net weighing mode.

2. Messages for both the Net and Gross weights are broadcast at this time.

Please note: The Net weight message is disabled after the Zero/Balance command. To get a new Net weight message, you must send the Tare command again.

An additional message provides the Net weight and will be broadcast by the scale **after the Tare command** has been sent to the scale, **or** TARE has been pressed on the scale interface (UT or SLC Display). The Net weight message broadcast time is based on the MENU 2 ISO WT (DAN2701) setting, which can be varied between 0.0(off) and 2 seconds in 0.1 second steps.

Examples:

CAN-ID	LENGTH	DATA (DDION)
0xCCBFF90	8	0x13 0x00 0xE5 0x00 0x00 0x00 0x00 0x00

CAN-ID	LENGTH	DATA (DDIOFF)
0xCCBFF90	8	0x13 0x00 0x4E 0x45 0x00 0x00 0x00 0x00

As weight is added, after TARE is pressed, the NET weight will increase.

CAN-ID	LENGTH	DATA (DDION)
0xCCBFF90	8	0x13 0x00 0xE5 0x00 0x10 0x5B 0x16 0x00

The Net weight shown is 0x00165B10 (1465104 decimal) grams or ~1465.1kg = 3230.0 lbs.

Negative values may also be shown when material is removed since the last TARE.

CAN-ID	LENGTH	DATA (DDION)
0xCCBFF90	8	0x13 0x00 0xE5 0x00 0x5D 0x02 0xBF 0xFF

The Net weight shown is 0xFFBF025D. 2's compliment the number to 0x40FDA3 which is -4259235 grams or about -4259.2 kgs = -9390 lbs.

To Enter Gross mode:

The scale can be commanded to enter Gross weight mode by sending the following message:
(note: on a multi-scale SL2x40, this will cause only the currently selected scale to enter gross mode)

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU. Data length: 8 bytes.

Example:

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0xFF 0xFF 0xFF 0xFF 0x47 0x47 0xCB

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0xFF	Command Value		Command value
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“
6	0x47	Command	'G'	Command (general command)
7	0x47	“	'G'	SubCommand (Enter Gross Mode)
8	0xCB	Checksum		Checksum

To Enter NET mode:

The scale can be commanded to enter NET weight mode by sending the following message:

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU. Data length: 8 bytes.

Example:

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0xFF 0xFF 0xFF 0xFF 0x47 0x4E 0xD2

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0xFF	Command Value		Command value
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“
6	0x47	Command	‘G’	Command (general command)
7	0x4E		‘N’	SubCommand (Enter Net Mode)
8	0xD2	Checksum		Checksum

ACK/NAK response from the scale:

The SL2xxx-ISO scale system will transmit an ACK/NAK message in response to command messages sent to the scale.

CAN id: 0x18E8yyxx where xx is the CAN address of the scale and yy is the id of your ECU. Data length: 8 bytes.

ID: 18E8EE91h Length: 8 Data: 00h 41h FFh FFh FFh 41h FFh 00h

Byte	Value	Parameter name	ASCII	Description
1	0x00	ACK/NAK		ACK = 00, NAK =01
2	0x41	Scale		Scale Id
3	0xFF			Reserved
4	0xFF			“
5	0xFF			“
6	0x41	Scale PGN		Scale PGN (lsb)
7	0xFF	“		Scale PGN
8	0x00	“		Scale PGN (msb)

The scale can be commanded to Enable or Disable ACK/NAK response to message commands:

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU. Data length: 8 bytes.

Example:

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0x45 0x00 0x00 0x00 0x47 0x6F 0x3C

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0x45	Command Value	'E'	Command value 'E'= Enable, 'D'= Disable
3	0x00	“		“
4	0x00	“		“
5	0x00	“		“
6	0x47	Command	'G'	Command (general command)
7	0x6F	“	'o'	Sub Command (Enable/Disable ack/nak)
8	0x3C	Checksum		Checksum

To Load a Setup Value:

The desired scale's setup number may be entered by sending the following message.

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.
Data length: 8 bytes.

Example: To Load Setup number 146040 (= 0x00023A78).

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0x78 0x3A 0x02 0x00 0x47 0x79 0xB5

Byte	Value	Parameter name	ASCII	Description
1	0x41	Scale		Scale id
2	0x78	Command Value		Command value (lsb)
3	0x3A	“		“
4	0x02	“		“
5	0x00	“		“ (msb)
6	0x47	Command	'G'	Command (general command)
7	0x79	“	'y'	SubCommand (enter a new short form setup value)
8	0xB5	Checksum		Checksum

To Load a Calibration Number:

The desired scale's calibration number may be entered by sending the following message.

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.
Data length: 8 bytes.

Example: To load calibration number 32640 (= 0x00007F80).

CAN-ID	LENGTH	DATA
0x18EF90EE	8	0x41 0x80 0x7F 0x00 0x00 0x47 0x7A 0x01

Byte	Value	Parameter name	ASCII	Description
1	0x41	Scale		Scale id
2	0x80	Command Value		Command value (lsb)
3	0x7F	“		“
4	0x00	“		“
5	0x00	“		“ (msb)
6	0x47	Command	'G'	Command (general command)
7	0x7A	“	'z'	SubCommand (Load a new Calibration number value)
8	0x01	CheckSum		Checksum

To request the calibration number stored in the SL2xxx-ISO scale:

A **specific scale's** calibration number may be requested by sending the following message with the 1st data byte set to 0x41 (Scale A), 0x42 (Scale B) , 0x43 (Scale C) , 0x44 (Scale D).

The **currently-selected** scale's calibration number may be requested by sending the following message with the 1st data byte set to 0x40. The response will indicate what the currently selected scale is by setting the first data byte of the response to 0x41 (Scale A) – 0x44 (Scale D).

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.
Data length: 8 bytes.

Example: To request the calibration number stored in the scale.

CAN-ID	LENGTH	DATA
0x18EF9001	8	0x4s 0xFF 0xFF 0xFF 0xFF 0x47 0x5A 0xDE

Byte	Value	Parameter name	ASCII	Description
1	0x4s	s = Scale #		s = Scale id #: 0x41 = Scale A 0x42 = Scale B 0x43 = Scale C 0x44 = Scale D Special case: 0x40 = 'currently selected scale' ; the response will include the first byte set as above to indicate which scale is currently selected along with the calibration number for the scale.
2	0xFF	Command Value		Command value (lsb)
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“ (msb)
6	0x47	Command	'G'	Command (general command)
7	0x5A	“	'Z'	SubCommand (request calibration number)
8	0xDE	Checksum		Checksum

The SL2xxx-ISO scale will transmit the calibration number using the process data message format defined in ISO 11783-7 with PGN 0xCB00, global destination address 0xFF, and priority 3:

Example:

CAN-ID	LENGTH	DATA
0x0CCBF90	8	0x13 0x00 0x91 0xE2 0x80 0x7F 0x00 0x00

Value = 0x00007F80 = 32640

Byte	Value <i>DDION</i>	Parameter Name	AS CII	Description	Value <i>DDIOFF</i>
1	0x13	Scale/Command		Upper nibble = Scale Identifier (1=Scale A, 2=Scale B, 3=Scale C, 4=Scale D) Lower nibble = Command (0x3)	
2	0x00	Empty			
3	0x91	DDI-lsb		DDI : 58001 == CALIBRATION number	0x43 'C'

4	0xE2	DDI-msb			0x00
5	0x80	Calibration Number		Value (lsb)	
6	0x7F	“		“	
7	0x00	“		“	
8	0x00	“		“ (msb)	

Note that the value is sent in reverse byte order (little endian).

To request the setup number stored in the SL2xxx-ISO scale:

A **specific scale’s** setup number may be requested by sending the following message with the 1st data byte set to 0x41 (Scale A), 0x42 (Scale B) , 0x43 (Scale C) , 0x44 (Scale D).

The **currently-selected** scale’s setup number may be requested by sending the following message with the 1st data byte set to 0x40. The response will indicate what the currently selected scale is by setting the first data byte of the response to 0x41 (Scale A) – 0x44 (Scale D).

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.
Data length: 8 bytes.

Example: To request the setup value stored in the scale.

CAN-ID	LENGTH	DATA
0x18EF9001	8	0x4s 0xFF 0xFF 0xFF 0xFF 0x47 0x59 0xDD

Byte	Value	Parameter name	ASCII	Description
1	0x4s	s = Scale #		s = Scale id #: 0x41 = Scale A 0x42 = Scale B 0x43 = Scale C 0x44 = Scale D Special case: 0x40 = 'currently selected scale' ; the response will include the first byte set as above to indicate which scale is currently selected along with the setup number for the scale.
1	0x41	Scale		Scale id
2	0xFF	Command Value		Command value (lsb)
3	0xFF	“		“
4	0xFF	“		“
5	0xFF	“		“ (msb)
6	0x47	Command	'G'	Command (general command)
7	0x59	“	'Y'	SubCommand (request setup number stored in scale)
8	0xDD	Checksum		Checksum

The SL2xxx-ISO scale will transmit the setup number using the process data message format defined in ISO 11783-7 with PGN 0xCB00, global destination address 0xFF, and priority 3:

Example:

CAN-ID	LENGTH	DATA
0x0CCBFF90	8	0x13 0x00 0x90 0xE2 0x78 0x3A 0x02 0x00

Value = 0x00023A78 = 146040

Byte	Value <i>DDION</i>	Parameter Name	ASCII	Description	Value <i>DDIOFF</i>
1	0x13	Scale/Command		Upper nibble = Scale Identifier (1=Scale A, 2=Scale B, 3=Scale C, 4=Scale D) Lower nibble = Command (0x3)	
2	0x00	Empty			
3	0x90	DDI-lsb		DDI : 58000 == SETUP number	0x53 'S'
4	0xE2	DDI-msb			0x00
5	0x78	Setup Number		Value (lsb)	
6	0x3A	"		"	
7	0x02	"		"	
8	0x00	"		" (msb)	

Note that the value is sent in reverse byte order (little endian).

Multiple Scale Platform

An ABC scale has multiple load cell inputs connected to four scale platforms- Scale A, Scale B, Scale C, and Scale D.

To Select A Specific Scale:

Select which scale's weight is displayed on the VT, and which scale the command messages are processed for:

To select the scale that scale commands are processed for:

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.

Data length: 8 bytes.

ID: 18EF90EEh Length: 8 Data: 41h 63h 00h 00h 00h 47h 41h 2Ch

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0x62	Command Value	'b'	Command value ('a'=Scale A, 'b'= Scale B, 'c'=Scale C, 'd'=Scale D) (lsb)
3	0x00	"		"
4	0x00	"		"
5	0x00	"		" (msb)
6	0x47	Command	'G'	Command (general command)
7	0x41	"	'A'	SubCommand (Select Scale Platform)
8	0x2B	Checksum		Checksum

Example: To Select Scale B.

CAN-ID	LENGTH	DATA
0x18EF9001	8	0x41 0x62 0x00 0x00 0x00 0x47 0x41 0x28

This will cause the VT to display the weight for scale B. Any command messages sent to the scale will be processed for scale B.

Example: To send the setup number and calibration number associated with scale B, the network message sequence would be:

(note: ISOADR = 145 (91h), *SENDING ECU has address EEh in example below*)

Command	ID	DATA
Select Scale B	18EF91EE	41 62 00 00 00 47 41 2B
ACK	18E8EE91	00 41 FF FF FF 41 FF 00
Load Scale B Setup	18EF91EE	41 78 3A 02 00 47 79 DD
ACK	18E8EE91	00 41 FF FF FF 41 FF 00
Load Scale B Calibration	18EF91EE	41 80 7F 00 00 47 7A 02
ACK	18E8EE91	00 41 FF FF FF 41 FF 00
Enter NET Mode Scale B	18EF91EE	41 FF FF FF FF 47 4E D2
ACK	18E8EE91	00 41 FF FF FF 41 FF 00

Note: When a Select Scale command has been processed by the SL-ISO scale system, the VT will display weight for the selected scale platform, and all command messages sent to the SL-ISO system will apply to the selected scale platform.

To Request a Weight value from scale A, B, C, & D:

To request weight from Scale A, B, C, & D.

PGN: 0xEF00.

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.

Data length: 8 bytes.

ID: 18EF90EEh Length: 8 Data: 41h 00h 00h 00h 00h 47h 6Bh F3h

Byte	Value	Parameter name	ASCII	Description
1	0x41	Command		
2	0x00	Command Value		Command value (All zero's to request all weights)
3	0x00	“		“
4	0x00	“		“
5	0x00	“		“
6	0x47	Command	'G'	Command (general command)
7	0x6B	“	'k'	SubCommand (Request a weight value)
8	0xF3	Checksum		Checksum

Examples:

CAN-ID	LENGTH	DATA
0x18EF9001	8	0x41 0x00 0x00 0x00 0x00 0x47 0x6B 0xF3

On the network, the message sequence will look like this:

(note: ISOADR = 145 (91h), SENDING ECU has address EEh in example below)

```
18EF91EEh 41 00 00 00 00 47 6B F3
18E8EE91h 00 41 FF FF FF 41 FF 00
0CCBFF91h 13 00 4B 00 77 7E F9 FF
0CCBFF91h 23 00 4B 00 77 7E F9 FF
0CCBFF91h 33 00 4B 00 77 7E F9 FF
```

```
Cmd.Request_Scale_Weight 41 00 00 00 00 47 6B F3
ACK_NAK                  00 41 FF FF FF 41 FF 00
Scale_Weight              13 00 4B 00 77 7E F9 FF
Scale_Weight              23 00 4B 00 77 7E F9 FF
Scale_Weight              33 00 4B 00 77 7E F9 FF
```

Note: If a Tare (GT) or NET (GN) command has been sent to the scale, the scale weight messages will also include the NET weight.

To Request a Weight value from scale A, or B, or C, or D:

To request weight from Scale A, B, or C.

PGN: 0xEF00.

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.

Data length: 8 bytes.

ID: 18EF91EEh Length: 8 Data: 41h 61h 00h 00h 00h 47h 6Bh 54h

Byte	Value	Parameter name	ASCII	Description
1	0x41	Scale		Scale Identifier
2	0x61	Command Value	'a'	Command value ('a'=Scale A, 'b'= Scale B, 'c'=Scale C, 'd'=Scale D)
3	0x00	"		"
4	0x00	"		"
5	0x00	"		"
6	0x47	Command	'G'	Command (general command)
7	0x6B	"	'k'	SubCommand (Request a weight value)
8	0x54	Checksum		Checksum

Example: Sending command from address EEh (238) TO Scale Link ECU at address 91h (145)

CAN-ID	LENGTH	DATA
0x18EF91EE	8	0x41 0x62 0x00 0x00 0x00 0x47 0x6B 0x55

On the network, the message sequence will look like this:

(note: ISOADR = 145 (91h), SENDING ECU has address EEh in example below)

```
18EF91EEh  41 62 00 00 00 47 6B 55
18E8EE91h  00 41 FF FF FF 41 FF 00
0CCBFF91h  23 00 4B 00 77 7E F9 FF
```

```
Cmd.Request_Scale_B_Weight 41 62 00 00 00 47 6B 55
ACK_NAK                    00 41 FF FF FF 41 FF 00
Scale_Weight.Gross         23 00 4B 00 77 7E F9 FF
```

If a Tare (GT) or NET (GN) command has been sent to the scale, the scale weight messages will also include the NET weight.

Example message sequence:

(note: ISOADR = 145 (91h), SENDING ECU has address EEh (238) in example below)

```
18EF91EEh  41 00 00 00 00 47 6B F3
18E8EE91h  00 41 FF FF FF 41 FF 00
0CCBFF91h  13 00 4B 00 77 7E F9 FF
0CCBFF91h  13 00 4E 45 00 00 00 00
0CCBFF91h  23 00 4B 00 77 7E F9 FF
0CCBFF91h  23 00 4E 45 00 00 00 00
0CCBFF91h  33 00 4B 00 77 7E F9 FF
0CCBFF91h  33 00 4E 45 00 00 00 00
```

```
Cmd.Request_Scale_Weight  41 00 00 00 00 47 6B F3
ACK_NAK                   00 41 FF FF FF 41 FF 00
Scale_Weight.Gross       13 00 4B 00 77 7E F9 FF
Scale_Weight.NET         13 00 4E 45 00 00 00 00
Scale_Weight.Gross       23 00 4B 00 77 7E F9 FF
Scale_Weight.NET         23 00 4E 45 00 00 00 00
Scale_Weight.Gross       33 00 4B 00 77 7E F9 FF
Scale_Weight.NET         33 00 4E 45 00 00 00 00
```

Please note: The Net weight message is disabled after the Zero/Balance command. To get a new Net weight message, you must send the Tare command again.

To Disable/Enable weight broadcast from scale A, B, C, and D:

To Disable continuous weight broadcast from Scale A, B, and C.

PGN: 0xEF00.

CAN id: 0x18EFxxyy where xx is the CAN address of the scale and yy is the id of your ECU.

Data length: 8 bytes.

ID: 18EF9001h Length: 8 Data: 41h 44h 00h 00h 00h 47h 6Bh 37h

Byte	Value	Parameter name	ASCII	Description
1	0x41	Scale		Scale Identifier
2	0x44	Command Value	'D'	Command value ('D'=Disable continuous weight broadcast, 'E'= Enable broadcast at 1 second broadcast interval)
3	0x00	“		“
4	0x00	“		“
5	0x00	“		“
6	0x47	Command	'G'	Command (general command)
7	0x6B	“	'k'	SubCommand
8	0x37	Checksum		Checksum

Example:

CAN-ID	LENGTH	DATA
0x18EF9001	8	0x41 0x44 0x00 0x00 0x00 0x47 0x6B 0x55

On the network, the message sequence will look like this:

(note: ISOADR = 144 (90h), SENDING ECU has address 01h, and ISODDI=OFF in example below)

Disable Weight Broadcast:

```
Scale_Weight.Gross      8    13 00 4B 00 00 00 00 00
Scale_Weight.Gross      8    23 00 4B 00 00 00 00 00
Scale_Weight.Gross      8    33 00 4B 00 B7 11 00 00
18EF9001h                8    41 44 00 00 00 47 6B 37
18E80190h                8    00 41 FF FF FF 41 FF 00
```

Enable Weight Broadcast:

```
18EF9001h                8    41 45 00 00 00 47 6B 38
18E80190h                8    00 41 FF FF FF 41 FF 00
Scale_Weight.Gross      8    13 00 4B 00 49 EE FF FF
Scale_Weight.Gross      8    23 00 4B 00 00 00 00 00
Scale_Weight.Gross      8    33 00 4B 00 B7 11 00 00
```

Additional messages for Troubleshooting:

Low Power/Tractor Battery: (sw version new than 170710)

The SL2 continuously monitors the incoming power, typically from the tractor battery. If the power level dips below approximately 10.7V, the SL2 will alert the user and system of the low power condition. In this state, the SL2 is nearing the power levels that will affect its ability to accurately read the attached load cells and supply an accurate weight measurement.

PGN: CB00h

Example:

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x03 0x00 0x78 0xE6 0xVV 0xVV 0xVV 0xVV

Where the 0xVV bytes are a 32bit float value of the input voltage measured by the SL2

Byte	Value	Parameter Name	Description
1	0x03	Scale/ Command	Upper nibble = 0 = Scale System Lower nibble = Command (0x3)
2	0x00		
3	0x78	DDI(lsb)	Vendor Specific DDI (lsb) DDI: 59000 (0xE678)
4	0xE6	DDI(msb)	“ (msb)
5	0xVV	lsb	LSB 32 bit float value of input voltage measurement
6	0xVV		...
7	0xVV		...
8	0xVV	msb	MSB

No IOSBUS Mask/IOP file Loaded: (sw version new than 170710)

If an ISOBUS Mask/IOP file has NOT been loaded into the SL2, the SL2 will broad cast the following message at a 1 second interval to indicate this status.

PGN: CB00h

Example:

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x03 0x00 0x7C 0xE6 0xFF 0xFF 0xFF 0xFF

Byte	Value	Parameter Name	Description
1	0x03	Scale/ Command	Upper nibble = 0 = Scale System Lower nibble = Command (0x3)
2	0x00		
3	0x7C	DDI(lsb)	Vendor Specific DDI (lsb) DDI: 59004 (0xE67C)
4	0xE6	DDI(msb)	“ (msb)
5	0xFF		Not used
6	0xFF		Not used
7	0xFF		Not used
8	0xFF		Not used

Invalid Date : (sw version new than 170710)

The SL2 has an internal coin cell battery to maintain time and date. When this battery dies (designed for ~10 year life), the typical failure mode will be that the date for the SL2's internal clock will reset to a value 01/01/1970.

If the DATE CHECK feature in SL2 is **DISABLED** (DAN1205), the SL2 will automatically set its internal time and date from time/date broadcast messages received from the ISOBUS (typically sent by the UT/VT). With DATE CHECK disabled, the SL2 will use the bus message date and time, even if it is obviously an invalid date.

If the DATE CHECK (DAN1205) feature is **ENABLED**, upon every power up, the SL2 will verify the current date *appears* to be valid by testing if the year is relatively recent. This allows test scenarios whereby the date can be set to appear to be a few years ago.

PGN: CB00h

Example:

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x03 0x00 0x7D 0xE6 0xmm 0xdd 0xyy 0xFF

Where the 0xmm is the month, 0xdd is the day of month, and 0xyy is the year the SL2 currently has set.

Byte	Value	Parameter Name	Description
1	0x03	Scale/ Command	Upper nibble = 0 = Scale System Lower nibble = Command (0x3)
2	0x00		
3	0x7D	DDI(lsb)	Vendor Specific DDI (lsb) DDI: 59005 (0xE67D)
4	0xE6	DDI(msb)	“ (msb)
5	0x08	Month	Current Month set in SL2 internal clock 0x8 = 8 => August
6	0x17	Day of Month	Current Day of Month set in SL2 internal clock 0x17 = 23 => 23 rd day of month
7	0x11	Year	Current Year set in SL2 internal clock 0x11 = 17 => 2017
8	0xFF	Not used	

Scale Status/Error/Warning Status : (sw version new than 170710)

The SL2 monitors several internal error conditions. When some of these errors are present, the SL2 may not be able to transmit a valid weight. When this occurs, the SL2 will transmit a vendor-specific DDI 59006 (0xE67E) with bit flags indicating what error(s) have been detected.

Status / Error / Warning Condition	DDI 59006 Broadcast Address Message data value
No Error	0x00000000
Minus Range Error	0x00000001
Plus Range Error	0x00000010
Over Capacity Error	0x00000100
Motion	0x00001000
A/D Calibration Error	0x00010000
Low Battery / Bus Power Condition	0x00100000

PGN: CB00h

Example:

CAN-ID	LENGTH	DATA
0xCCBFF90	8	0x03 0x00 0x7D 0xE6 0x## 0x## 0x## 0x##

Byte	Value	Parameter Name	Description
1	0x03	Scale/ Command	Upper nibble = 0 = Scale System Lower nibble = Command (0x3)
2	0x00		
3	0x7E	DDI(lsb)	Vendor Specific DDI (lsb) DDI: 59006 (0xE67E)
4	0xE6	DDI(msb)	“ (msb)
5	0x00	Value LSB	LSB of bit-encoded status word (32 bits) see table above for description of value/bit meanings
6	0x00	Value	... bit-encoded status word
7	0x00	Value	... bit-encoded status word
8	0x00	Value MSB	MSB of bit-encoded status word

Changing SL2 settings (DAN code) via CAN messages

(ONLY supported in SW version 180705 and later (may be in some earlier test versions))

SET Direct Access Number (DAN) codes over CAN

Refer to the descriptions for each DAN code to Get/Set for the numeric format to use when setting or to expect/interpret when getting. Some are integers, some are floating point values.

General Format of messages to SET Direct Access Number (DAN) codes over CAN:

CANID: 18EF9080 (where 90h is SL2 address; 80h is sender address (tool/other ECU))

Data0: 0x50 == GET **0x60 == SET**

 0x51 == Get-Response **0x61 == Set-Response**

Data1: msb of DAN code

Data2:

Data3: lsb of DAN code

Data4-7: value of DAN setting (msb – lsb(byte7))

Example:

Example: **SET** the Length-On-Scale (DAN7301) to 610 mm == **Integer** Value

From address 0x80

To (SL2) address 0x90

CAN-ID	LENGTH	DATA
0x18EF9080	8	0x60 0x00 0x1C 0x85 0x00 0x00 0x02 0x62

Byte	Value	Parameter Name	Description
1	0x60	SET DAN Command	Set a DAN code value
2	0x00	Empty	Not used by SL2
3	0x1C	DAN code - msb	Length On Scale DAN 7301 = 0x1C85 (msb)
4	0x85	DAN code - lsb	“ (lsb)
5	0x00	length (msb)	Set to 610 mm = 0x00000262 (msb)
6	0x00	“	“
7	0x02	“	“
8	0x62	“ (lsb)	“ (lsb)

RESPONSE From (SL2) address 0x90

CAN-ID	LENGTH	DATA
0x18EF8090	8	0x61 0x00 0x1C 0x85 0x00 0x00 0x02 0x62

Byte	Value	Parameter Name	Description
1	0x61	Response SET DAN Command	RESPONSE to Set a DAN code command
2	0x00	Empty	Length On Scale DAN 7301 = 0x 1C85 (msb)
3	0x1C	DAN code - msb	
4	0x85	DAN code - lsb	“ (lsb)
5	0x00	length (msb)	Echo of value set (msb)
6	0x00	“	“
7	0x02	“	“
8	0x62	“ (lsb)	“ (lsb)

NOTE: IF the value set is invalid, the SL2 will respond with an ISOBUS NACK message

GET Direct Access Number (DAN) codes over CAN

General Format of messages to GET Direct Access Number (DAN) codes over CAN:

CANID: 18EF9080 (where 90h is SL2 address; 80h is sender address (tool/other ECU))

Data0: **0x50** == GET 0x60 == SET

0x51 == Get-Response 0x61 == Set-Response

Data1: msb of DAN code

Data2:

Data3: lsb of DAN code

Data4-7: value of DAN setting (msb – lsb(byte7))

Example:

Example: **GET** the ISO WT broadcast message interval (DAN2701) == **float** value

From address 0x80

To (SL2) address 0x90

CAN-ID	LENGTH	DATA
0x18EF9080	8	0x50 0x00 0x0A 0x8D 0x00 0x00 0x00 0x00

Byte	Value	Parameter Name	Description
1	0x50	SET DAN Command	Set a DAN code value
2	0x00	DAN code - msb	Length On Scale DAN 2701 = 0x000A8D (msb)
3	0x0A	DAN code	
4	0x8D	DAN code - lsb	“ (lsb)
5	0x00	length (msb)	Not currently used on GET Requests
6	0x00	“	“ “
7	0x00	“	“ “
8	0x00	“ (lsb)	“ “

RESPONSE From (SL2) address 0x90: floating point value of 1.0

CAN-ID	LENGTH	DATA
0x18EF8090	8	0x61 0x00 0x1C 0x85 0x3F 0x80 0x00 0x00

Byte	Value	Parameter Name	Description
1	0x61	Response SET DAN Command	RESPONSE to Set a DAN code command
2	0x00	DAN code - msb	Length On Scale DAN 2701 = 0x000A8D (msb)
3	0x0A	DAN code	
4	0x8D	DAN code - lsb	“ (lsb)
5	0x3F	length (msb)	Current Value 1.0 sec = 0x3F800000 FLOAT value (msb)
6	0x80	“	“
7	0x00	“	“
8	0x00	“ (lsb)	value (lsb)

NOTE: IF the DAN code requested is not supported, the SL2 will respond with an ISOBUS NACK message, echoing the DAN code in bytes 2-4.

NOTE: in SL2 software version prior to 180313, the SL2 will ignore an invalid DAN request