STARLOG

MACRO Data Logger
Field Termination Strip
& Isolated Input Module

Model 7100
Model 7121

CE

User Manual Supplement
6234

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1. INTRODUCTION

This supplement explains the installation and operation of the STARLOG MACRO Field Termination Strip (FTS) and Frame (Model 7100-1). This product extends the STARLOG MACRO Data Logger signal connections to a row of numbered screw terminals. The MACRO FTS simplifies on-site installation and ensures a tidy installation (particularly for complex applications).

1.1. How to Use this Supplement

This supplement is divided into 4 chapters:

Introduction – (which you are reading now) introduces the Field Termination Strip & Frame and describes how information is organised in this supplement.

Installation of Frame and Strip – this chapter explains how to install the Field Termination Strip into the mounting frame.

Terminations on the Strip – this chapter provides a table and a diagram listing each termination and its intended use.

Signal Description – this chapter provides specifications for each signal accepted by the Field Termination Frame.

2. INSTALLATION OF FRAME AND STRIP

The frame is designed to be mounted inside a Model 6701 Weatherproof Enclosure. (The frame may, however, be screwed to any suitable surface). The FTS is designed to be mounted on the frame (however the FTS may be mounted in any convenient location adjacent to the Data Logger).

Model 7100-1 Field Termination Strip & Mounting Frame

2.1. Mounting Frame - Model 6103C

The frame provides:

a) a shelf on which the Data Logger is held in place
b) mounting bracket & holes for the Termination Strip

c) 4 x 6mm mounting holes (at each corner)

» NOTE: The Portable Data Logger and the HIRES Interface use the same mounting frame (model 6103C).

Installation Procedure

1. Open the Weatherproof Enclosure and locate Mounting Frame inside with the shelf towards the bottom and the angle support to the left side of the enclosure.
2. Use four (4) M6 x 8mm screws through each corner mounting hole to secure the frame into the M6 captured nuts in the back of the enclosure.

2.2. Installation of Field Termination Strip

The Termination Strip is designed to be mounted on four (4) PCB nylon mountings. The two at the front of the strip are hinged, and the two at the rear of the strip have a retention clip. This mounting arrangement allows the strip to be swung out (forward) from the mounting frame to enable access to the side (for calibration adjustments) and rear (for configuration & soldering) of the installed strip.

1. Firmly push the two rear nylon mounts into the holes provided in the mounting frame. Ensure the retention lever is to the rear.
2. Firmly push the two front mounts into their holes with the hinge edge to the front.
3. Firmly push the two front mounts into the corresponding mounting holes in the front edge of the Termination Strip (so that the Data Logger connection is to the top). Ensure that the small locking tab has passed through the strip and is holding the strip PCB securely.
4. Swing the strip back onto the rear mounts until the retention clip engages. (To release strip, push back the top then bottom retention clip lever and swing the strip forwards)

3. TERMINATIONS ON THE STRIP

This section provides a table and a diagram listing each termination on the MACRO FTS. The diagram also shows the locations of signal conditioning links (described in section 4.)

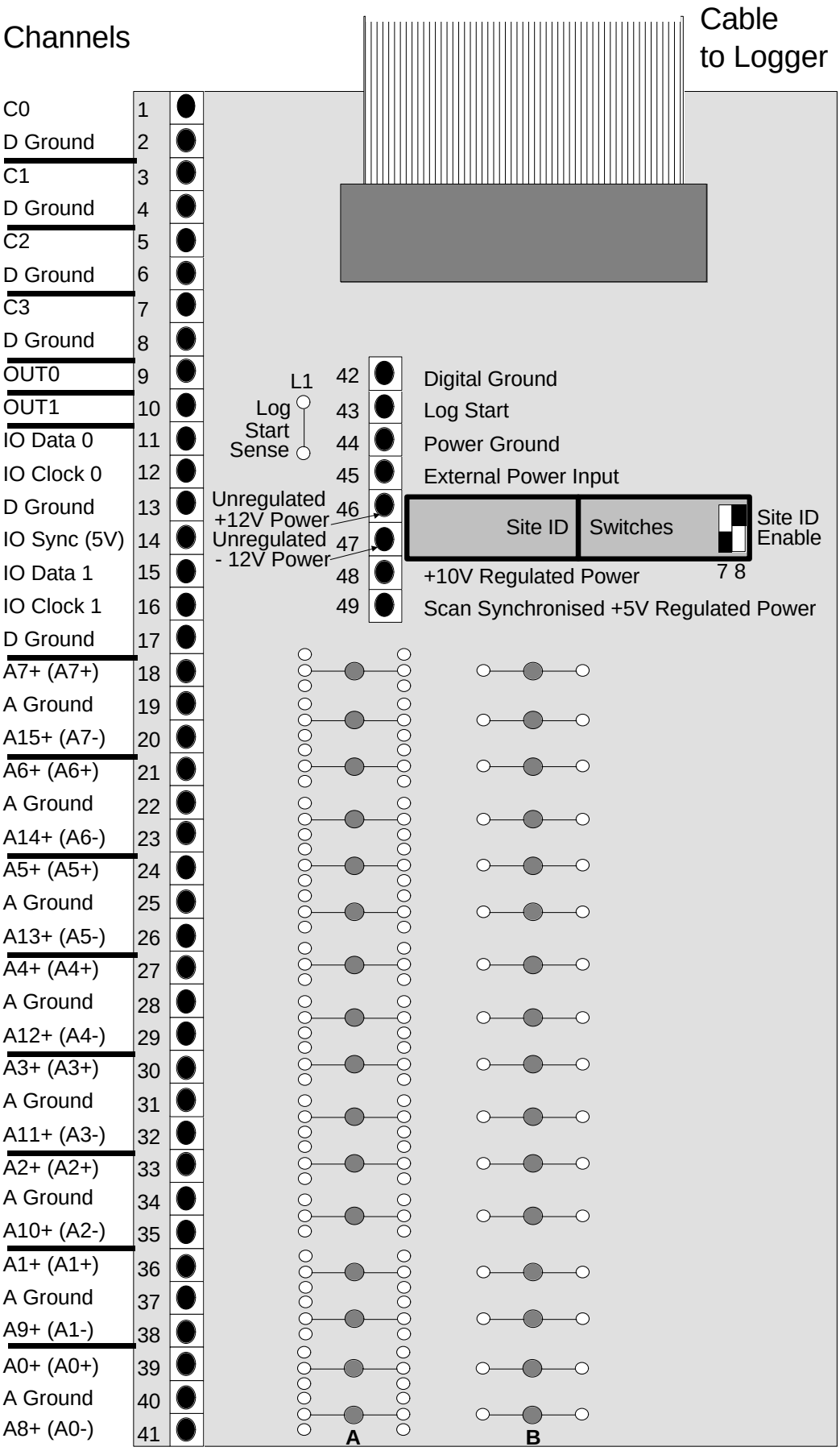
The table below lists each termination. It includes a brief description, the corresponding channel used in STARLOG Software Version 3, and the corresponding pin in the MACRO Data Logger Input Signals connector.

Terminal	Description	Channel	Pin
1	16-bit counter input	c0	11
2	Digital Ground		28
3	16-bit counter input (300 Hz)	c1	29
4	Digital Ground		28
5	16-bit counter input (300 Hz)	c2	12
6	Digital Ground		28
7	16-bit counter input	c3	30
8	Digital Ground		28
9	Control, Open Collector output, 30V, 100mA drive, programmable pulse width	OUT 0	33
10		OUT 1	15
11	Hi-speed synchronous serial bus Data 0	s0 to s7	32*
12	High Speed Synchronous Serial Bus Clock 0 (TTL level Input and Output)		14
13	Digital Ground		28
14	High Speed Synchronous Serial Bus Sync		18
15	High Speed Synchronous Serial Bus Data 1 (TTL level Input and Output)	s8 to s15	31
16	High Speed Synchronous Serial Bus Clock 1 (TTL level Input and Output)		13
17	Digital Ground		28
18	A7 Input +ve, single & differential	A7	5
19	ANALOG Ground		1
20	A15 +ve single (A7 -ve differential)	A15	9
21	A6 Input +ve, single & differential	A6	23
22	ANALOG Ground		1
23	A14 +ve single (A6 -ve differential)	A14	27

Terminal	Description	Channel	Pin
24	A5 Input +ve, single & differential	A5	4
25	ANALOG Ground		1
26	A13 +ve single (A5 -ve differential)	A13	8
27	A4 Input +ve, single & differential	A4	22
28	ANALOG Ground		1
29	A12 +ve single (A4 -ve differential)	A12	26
30	A3 Input +ve, single & differential	A3	3
31	ANALOG Ground		1
32	A11 +ve single (A3 -ve differential)	A11	7
33	A2 Input +ve, single & differential	A2	21
34	ANALOG Ground		1
35	A10 +ve single (A2 -ve differential)	A10	25
36	A1 Input +ve, single & differential	A1	2
37	ANALOG Ground		1
38	A9 +ve single, (A1 -ve differential)	A9	6
39	A0 Input +ve, single & differential	A0	20
40	ANALOG Ground		1
41	A8 +ve single (A0 -ve differential)	A8	24
42	Digital Ground		28
43	Log Start		10
44	Power Ground		34
45	External power or recharge		16
46	+12V unregulated power source		37
47	-12V unregulated power source		36
48	+10V regulated power source		35
49	Scan synchronised +5V reg. pwr source		18

* See page 9.

» Note: channels referred to as A0 – A15 in STARLOG Software Version 3 are referred to as h0 – h15 in STARLOG Software Version 2 .



SYMBOLS & ABBREVIATIONS				
A = Analog	C = Counter	( ) = differential analog	● = Solder links	a,b = links

4. SIGNAL DESCRIPTION

This chapter provides information you need about the inputs and outputs of the MACRO Field Termination Strip including; the Log Start Sense, Counters and digital Sense inputs, open collector outputs, the high speed serial channels, analog inputs, and the user's power sources.

4.1. Log Start Sense

The Log Start Sense (L1) is normally fitted. This enables the Logger to recognise when you connect the Macro FTS to the Input Signals connector and start the Logger scan. Alternatively, you can use Terminal 43 as a Log Start, however you must cut the L1 link. (See the description of the startup .INCLUDE file in the STARLOG Programmer's Supplement for details.)

4.2. Counters and Sense Inputs

Counters and Sense inputs are DC inputs, suitable for 5kHz potential free contacts or 5V to 12V DC digital input.

Maximum pulse rate to the counters is 5kHz. Pulse rates must also be related to scan rate, to ensure counters do not overflow before being scanned by the Data Logger.

4.3. Open Collector Outputs

There are two Open Collector Controls (Terminals 9 and 10) rated at 100mA. These can be used to switch on/off relays controlling experiments.

The Pulse instruction switches a control on momentarily. The Switch instruction switches a control on indefinitely until switched off by another Switch instruction.

4.4. High Speed Serial Input/Output Channels

There are two serial input channels:

channel 0	Terminal 11 (IO Data 0)
	Terminal 12 (IO Clock 0)
channel 1	Terminal 15 (IO Data 1)
	Terminal 16 (IO Clock 1)
	Terminal 14 +5V sync signal

Each logger scan, the High Speed Serial Channels are read. The Sync signal (Terminal 14) is used to indicate to the remote equipment that a logger read scan is about to begin. This signal is usually used to load the serial shift register(s) in the remote equipment in preparation of being read. (NOTE: the first data bit LSB must be present on the Data (0/1) signal within 7ms after the Sync signal.

Serial transfer rate is 50 microseconds per bit with a 30 microsecond gap between each byte. (NOTE: every 1 millisecond a logger interrupt sequence adds a 50 microsecond delay to the serial transfer sequence. Transfer starts with the least significant bit of the least significant byte and each clock reads the next most significant bit. See the Macro Data Logger Hardware Supplement for timing diagrams.

Terminal 11, IO Data 0 - When Site ID is enabled, the signal on Terminal 11 passes through the shift register before going to pin 32, therefore, site ID information occurs in the first two bytes. STARLOG software will differentiate between the two different pieces of information if the Scheme indicates that site identification is being used.

When Site ID is disabled the signal on Terminal 11 passes directly to pin 32.

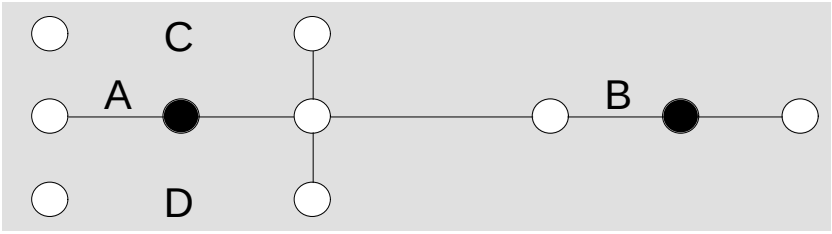
4.5. Analog Inputs

Inputs labelled A0 – A15 may be logged as low resolution values (8 bit data) by selecting a0 – a15 (a0 – a7 in PDL Emulation Mode) *and/or* high resolution values (16 bit) by selecting A0 – A15 in the STARLOG Software Package Version 3. (High resolution channels are referred to as h0–h15 in Version 2.)

Analog inputs may be single ended or differential.

All Analog Channels are programmable to carry a signal in one of three ranges: -5.000 to +5.000 Volts (1.25 millivolts resolution); -500 to +500 millivolts (125 microvolts resolution); -50 to +50 millivolts (12.5 microvolts resolution). Input impedance (that is, when the logger is active) is greater than 1 MΩ. Load impedance (that is, when the Logger is inactive) for signals less than 500

millivolts is greater than 1 MOhm, while for signals greater than 500 millivolts, it is 10 kOhms. The recommended source drive impedance is <10 kOhm.



Link Locations (see page 6)

4.5.1. Analog Channel Signal Conditioning Circuit

Input signal conditioning facilities are available on the MACRO FTS for all Analog channels. The four different link locations are described below.

Link A Divider Series Resistor

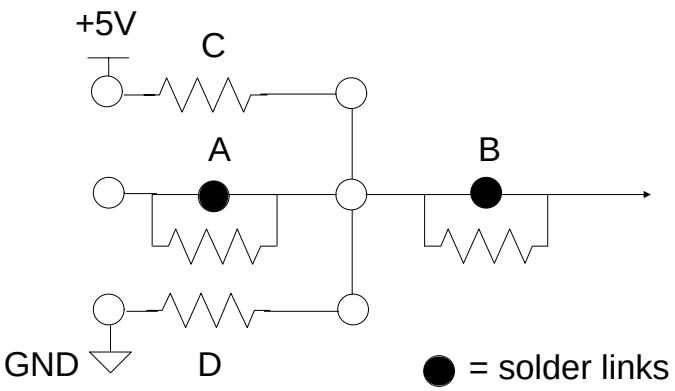
This component location (along with component location D) is used as part of a voltage divider network for example, when using Model 6104A/B/C/D Voltage Dividers. It can also be used for a series resistor.

Link B Protection Series Resistor

This component location is used to install a resistor in series with the input signal (to prevent excessive external power being applied to the logger). Used for any externally powered signals (e.g. active pulses, voltages).

Link C Pull-up to +5V

This component location is used to install thermistor reference resistors or to convert an analog channel for ON/OFF sensing.



Input Signal Conditioning Circuit

Link D Pulldown to GND

This component location is used to install a filter capacitor (for pulse inputs) or voltage divider resistor (for voltage attenuation).

4.6. User's Power Sources

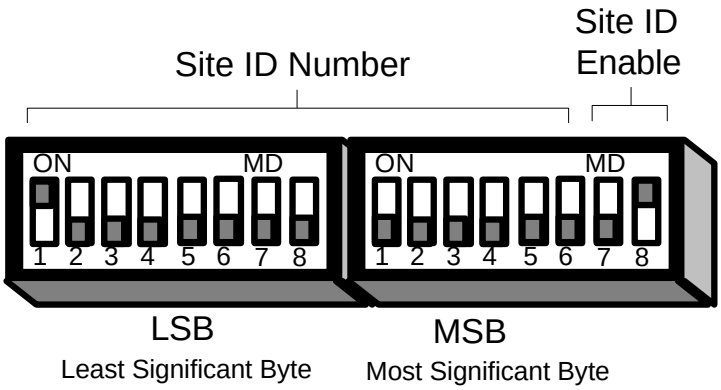
The User's Power Sources (Terminals 46, 47, 48 and 49) are intended to power instruments associated with the Data Logger. The Power Sources at terminals 46, 47, 48 are completely isolated from the MACRO Data Logger internal power supply. The total current from all supplies is 250 mA. These outputs MUST NOT be overloaded or damage to the user power source system will result.

The Scan Synchronised User Power Source (Terminal 49) switches on and off (synchronized with the Logger Scan). Any loads connected to this output will contribute to the drain on the Data Logger battery (and reduce battery life). Loads should be limited to 100 mA.

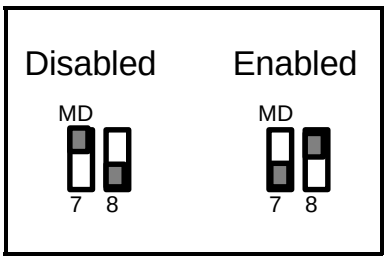
5. SITE IDENTIFICATION

Two switches on the Field Termination Strip are used for Site Identification (ID). The switch levers on these switches determine what the Site ID number is and whether or not the Site ID option is being used.

Each switch lever in the 8-way DIL switches is labelled with a number from 1 to 8. All but two of these switch levers set the Site ID number. Switch levers 7 and 8 on the switch near the edge of the board are used to enable and disable the



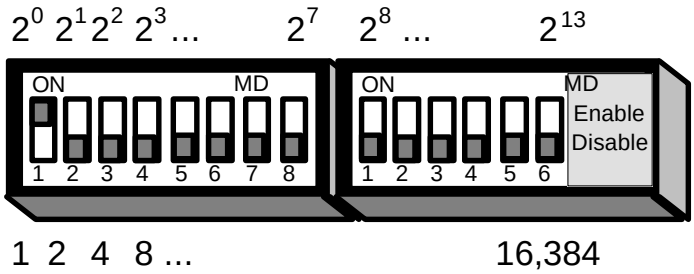
Site ID option.



The settings to enable and disable Site ID are shown to the right.

The Site ID number is set by the combination of settings on the first 14 switch levers (see diagram above, LSB switches 1 to 8 and MSB switches 1 to 6).

Each switch lever represents a number as shown in the picture on the right. These numbers are binary values - each switch lever is a power of 2 in ascending order. When a switch lever is set to the ON position its value is added to the Site ID number.



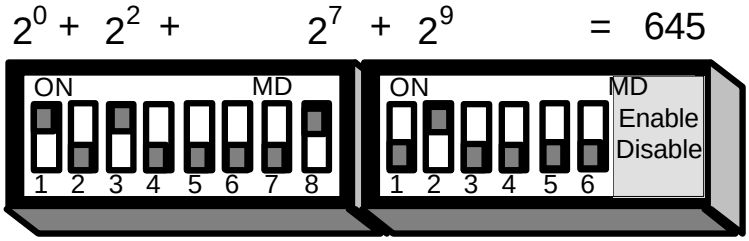
For example, switch lever 1 on the first switch (LSB) adds 1 to the Site ID number, switch lever 3 adds 4 to the Site ID number. (See the example on the next page.)

5.1. Example of Setting the Site ID Number

The picture below illustrates how to set the site ID number to 645.

Four switch levers are set to ON.

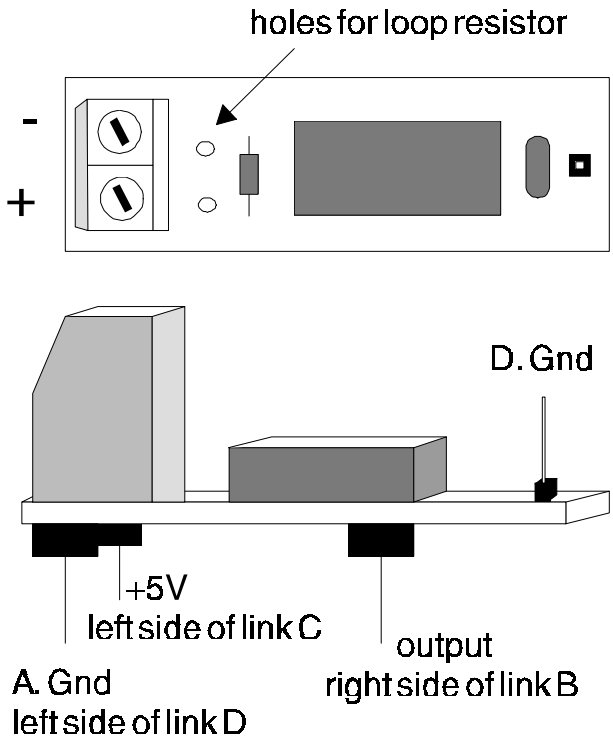
First Switch (LSB)	Switch 1 (2^0) =	1
	Switch 3 (2^2) =	4
	Switch 8 (2^7) =	128
Second Switch (MSB)	Switch 2 (2^9) =	512
	The Site ID number is	645



6. MACRO ISOLATED INPUT MODULE

The Isolated Input Module provides isolation for transducers which cannot be directly connected to the Logger, e.g., current loop transducers powered from separate supplies. Eight modules can be fitted onto the Field Termination Strip.

1. Install Module (see diagram.)
    1) output pin into right hole of Link b.
    2) 5V pin into left hole of Link c.
    3) Analog Ground pin into left hole of Link d.
    4) Solder wire onto Digital Ground pin and connect other end to a Digital Gnd Terminal (42 or 44).
3. Connect signals to terminals (as shown.)
4. A loop resistor may be soldered onto the Module between the terminal block and the relay (see diagram.)



Model 7121A – Isolated Input Module

Specifications:

Input Signal:	single-ended or differential, 0 to ± 5V DC
Output Signal:	isolated input signal, not amplified
Isolation:	flying capacitor, relay isolated
Power:	5V DC, 25mA from Logger

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7. INPUT SIGNAL RECORD SHEET

Channel	Description	Scaling from/to	Units	Links/ Modules
A0				
A0- / A8				
A1				
A1- / A9				
A2				
A2- / A10				
A3				
A3- / A11				
A4				
A4- / A12				
A5				
A5- / A13				
A6				
A6- / A14				
A7				
A7- / A15				
C0				
C1				
C2				
C3				
Data 0				
Data 1				
Out 0				
Out 1				
Sense 1				

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