

# PWNKEMON

## Challenge Text

The picture should explain everything.

Careful, flag format is in a different format: `cscg(...)`

## Challenge Work

First, lets unzip the challenge packet:

```
/tmp % unzip pwnkemon.zip
Archive:  pwnkemon.zip
  inflating: pwnkemon.jpg
  inflating: pwnkemon.logicdata
```

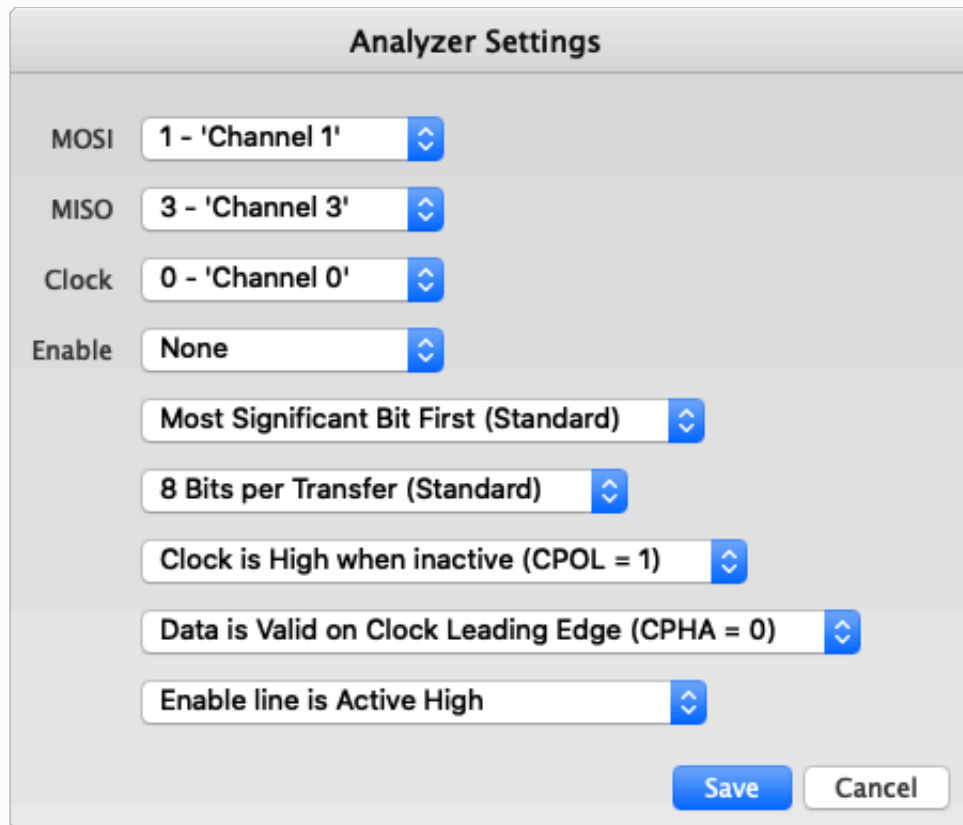
Second, lets look at the picture -



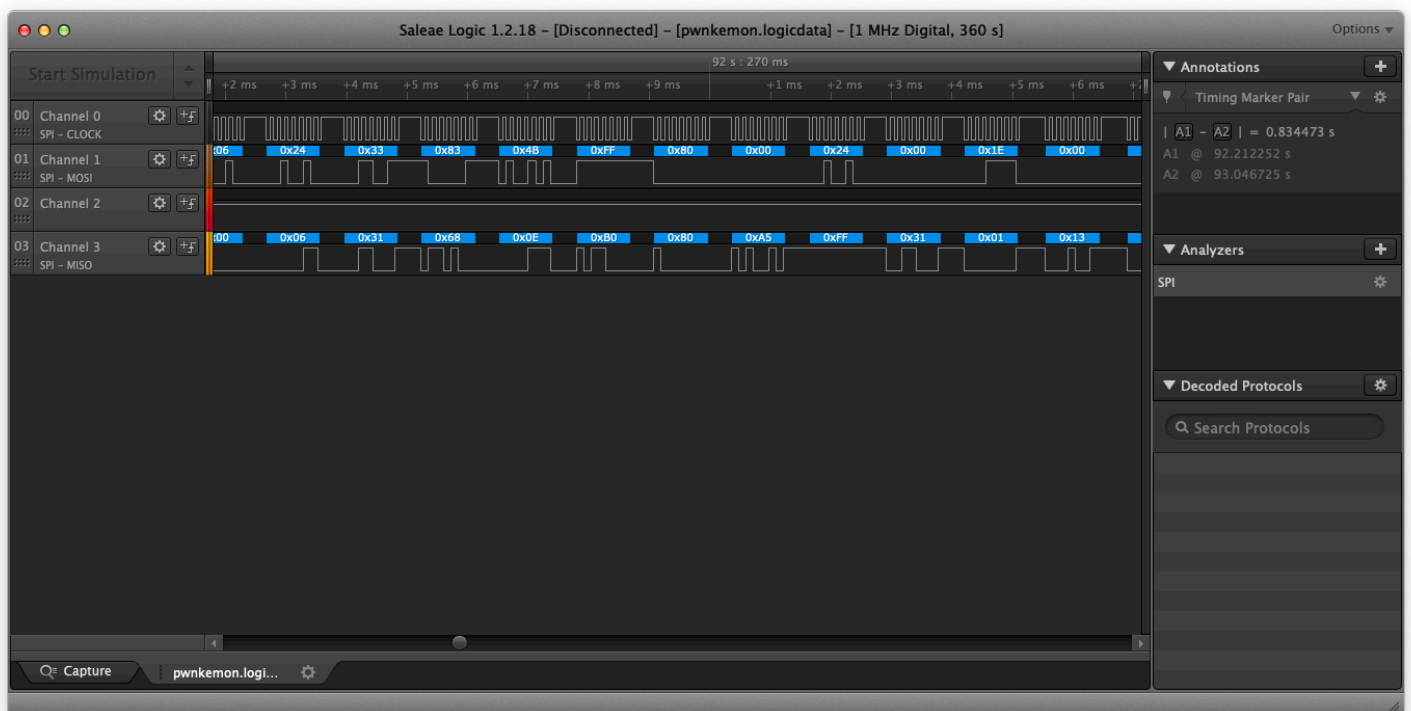
We see a logic analyzer attached to a GameBoy Link cable. We can see that the guide behind the Gameboys says Pokémon. We can probably assume we will be looking at a logic capture of a Pokémon trade.

We open the `.logicdata` file in the free demo of Saleae and we can confirm that it is a capture of four digital channels. We can also determine, from Google, that the Gameboy Link Cable uses SPI as a protocol. Saleae has a built in SPI decoder. After messing with the settings we got some hexadecimal information to display.

Here is the SPI settings we used:



We then went into Saleae and set a marker around where the file opened up naturally (around 92ms). We then enabled the SPI analyzer and then we saw things like this:



After this we exported the two channels to a CSV, keeping only the hexadecimal values. (See `spi.csv`)

We noticed these bytes did not decode into anything legible. At first we were stumped, then I had the thought to Google if the generation one Pokémon games used their own special encoding. It turns out they do. (You can read more [here](#) if you are interested.)

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-	NULL															
1-																
2-																
3-																
4-																
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6-	A	B	C	D	E	F	G	H	I	V	S	L	M	:	い	う
7-	'	'	"	"	.	...	あ	え	お							
8-	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
9-	Q	R	S	T	U	V	W	X	Y	Z	(	)	:	;	[	]
A-	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
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C-																
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E-	'	P <sub>K</sub>	M <sub>N</sub>	-	'r	'm	?	!	.	ア	ウ	エ	▶	▶	▼	♂
F-	♀	x	.	/	,	♀	0	1	2	3	4	5	6	7	8	9

For each byte that we get from the capture we take the first character and select that corresponding row, then we take the second character and select that corresponding column.

I took this chart and made it into a CSV of its own, replacing all of the `NULL`, `Junk`, `Control`, or `Text box` characters with `*`. (See `gen_chars.csv`)

I then wrote a script to display the generated translations. I tried the MOSI first, but that was not right. Then I tried the MISO and that gave us our flag.

```
import pandas as pd

chars_df = pd.read_csv("./gen_chars.csv")
spi_df = pd.read_csv("./spi.csv")

bytes_map = {
    "0": 0,
    "1": 1,
```

```

    "2": 2,
    "3": 3,
    "4": 4,
    "5": 5,
    "6": 6,
    "7": 7,
    "8": 8,
    "9": 9,
    "A": 10,
    "B": 11,
    "C": 12,
    "D": 13,
    "E": 14,
    "F": 15
}

def get_gen_char(byte_string):
    byte_one = byte_string[2]
    byte_two = byte_string[3]

    char_row = bytes_map[byte_one]

    return chars_df.iloc[char_row][byte_two].strip()

mosi_list = spi_df.MOSI.tolist()
miso_list = spi_df.MISO.tolist()

try_word = []

for char in miso_list:
    try:
        try_word.append(get_gen_char(char))
    except:
        pass

print("".join(try_word))

```

```

[.....]
CSCG(GONNA*-hack-em-A*ll-PWNkemo*n!!!)
[.....]

```

I removed the `*`'s from the string for the final true flag of: `CSCG(GONNA-hack-em-All-PWNkemon!!!)`

## Bonus

Here is what the MISO and MOSI trade data looked like. Can you figure out which two they traded? [Here](#) is an example trade, showing the bytes. ([Here](#) is the source.)

**MISO**

```

****AAAAAAAAAAAAA*****8AAAAAAAAAAAA
A*****7777777y**p**x'*77777777DRACON*****I*qA9*****うお
*wiVkl'tSWsdVW*R*****'s*****9*****9**;Zうお
*y*HKI'sHuHphD*:*****MN***C*YI*7*****C*うお
**►E*EaE*E*E*あ'r*****7*b*X***.**3*****K:F*うお*y*H"ICI*H*Gs.....3*
[*U*►**q*****m*****r*****):**O*****A*B*****'t*****うお
*MB*****e*****B*****DRACON*****DRACON*****DRACON*****DRACON*****RED*ASH*J
ACDRACON*****CSCG(GONNA*-hack-em-A*ll-
PWNkemo*n!!!)*****CHARMANDER*GOLDDUCK****9]*7777*****99*****
*****
*****A
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA*****CCCCCCCCCCCCC*****CCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC*****CCCCCCCCCCCCC*****77777777**
*****E777777777DRACON*****I*qAf9*****9**;Zうお
*y*HKI'sHuHphD*:*****MN***C*YI*7*****C*うお
**►E*EaE*E*E*あ'r*****7*b*X***.**3*****K:F*うお*y*H"ICI*H*Gs.....3*
[*U*►**q*****m*****r*****):**O*****A*B*****'t*****うお
*MB*****e*****B*****f*****9**C*m*****C*u*****DRACON**
**DRACON*****DRACON*****RED*ASH*JACDRACON*****RED*ASH*JAC-hack-em-A*ll-
PWNkemo*n!!!)*****CHARMANDER*GOLDDUCK****RATTATA****9]*7777*****99*****
*****
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*****77777777*►'dL****zV777777777DRACON*****I*qAf9*****9**;Zうお
*y*HKI'sHuHphD*:*****MN***C*YI*7*****C*うお
**►E*EaE*E*E*あ'r*****7*b*X***.**3*****K:F*うお*y*H"ICI*H*Gs.....3*
[*U*►**q*****m*****r*****):**O*****A*B*****'t*****うお
*MB*****e*****B*****f*****9**C*m*****C*u*****DRACON**
**DRACON*****DRACON*****RED*ASH*JACDRACON*****RED*ASH*JAC-hack-em-A*ll-
PWNkemo*n!!!)*****CHARMANDER*GOLDDUCK****RATTATA****9]*7777*****99*****

```

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*AAAAAAAAAA\*\*\*\*\*CCCCCCCCCCCC\*\*\*\*\*CCCCCCCCCCCCCCCCCCCCCCCC  
CCCCCCCCCCCCCCCCCCCCCCCC\*\*\*\*\*CCCCCCCCCCCC\*\*\*\*\*7777777♂\*\*W\*y\*MN\*\*77  
7777777DRACON\*\*\*\*\*I\*qAf\*9I\*7\*\*\*\*\*C\*うお  
\*\*►E\*EaE\*E\*E\*あ'r\*\*\*\*\*7\*b\*X\*\*\*. \*\*3\*\*\*\*\*K:F\*うお\*y\*H"ICI\*H\*Gs\*...\*\*\*\*\*3\*  
[\*U\*►\*\*q\*\*\*\*\*m\*\*\*\*\*r\*\*\*\*\*)\*\*:O\*\*\*\*\*A\*B\*\*\*\*'t\*\*\*\*うお  
\*MB\*\*\*\*\*e\*\*\*\*\*B\*\*\*\*\*f\*\*\*\*\*9\*\*C\*m\*\*\*\*\*C\*u\*\*\*\*\*9\*  
\*\*\*m\*\*\*\*\*?k\*4\*\*\*い  
A\*\*\*\*\*DRACON\*\*\*\*\*DRACON\*\*\*\*\*RED\*ASH\*JACDRACON\*\*\*\*\*RED\*ASH\*JACRED\*ASH\*JA  
Cll-  
PWNkemo\*n!!!)\*\*\*\*\*CHARMANDER\*GOLDUCK\*\*\*\*RATTATA\*\*\*\*PIDGEY\*\*\*\*\*9]\*7777\*\*\*\*\*99\*\*  
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\*\*\*\*\*AA  
AA\*\*\*\*\*CCCCCCCCCCCC\*\*  
\*\*\*\*\*CC\*\*\*\*\*CCCCCCCCCC  
CC\*\*\*\*\*77777777\*\*\*\*Ae\*. \*\*777777777DRACON\*\*\*\*\*qAf\*\*9\*\*3\*\*\*\*\*K:F\*うお  
\*y\*H"ICI\*H\*Gs\*...\*\*\*\*\*3\*  
[\*U\*►\*\*q\*\*\*\*\*m\*\*\*\*\*r\*\*\*\*\*)\*\*:O\*\*\*\*\*A\*B\*\*\*\*'t\*\*\*\*うお  
\*MB\*\*\*\*\*e\*\*\*\*\*B\*\*\*\*\*f\*\*\*\*\*9\*\*C\*m\*\*\*\*\*C\*u\*\*\*\*\*9\*  
\*\*\*m\*\*\*\*\*?k\*4\*\*\*いA\*\*\*\*\*:\*うお\*\*►H\*I\*HdV\*I\*\*\*\*\*  
(\*\*\*\*DRACON\*\*\*\*\*RED\*ASH\*JACDRACON\*\*\*\*\*RED\*ASH\*JACRED\*ASH\*JACDRACON\*\*\*\*\*n!!!)\*\*\*\*\*  
CHARMANDER\*GOLDUCK\*\*\*\*RATTATA\*\*\*\*PIDGEY\*\*\*\*\*MAGMAR\*\*\*\*\*9]\*7777\*\*\*\*\*99\*\*\*\*\*  
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\*\*\*\*\*  
\*\*\*\*\*AA  
AA\*\*\*\*\*CCCCCCCCCCCC\*\*  
\*\*\*\*\*CC\*\*\*\*\*CCCCCCCCCC  
CC\*\*\*\*\*77777777I'\*GUew\*\*077777777DRACON\*\*\*\*\*qAf\*\*D9q\*\*\*\*\*m\*\*\*\*\*r\*\*  
\*\*)\*\*:O\*\*\*\*\*A\*B\*\*\*\*'t\*\*\*\*うお  
\*MB\*\*\*\*\*e\*\*\*\*\*B\*\*\*\*\*f\*\*\*\*\*9\*\*C\*m\*\*\*\*\*C\*u\*\*\*\*\*9\*  
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F\*V\*V\*Ag\*\*\*\*\*►\*\*\*\*\*RED\*ASH\*JACDRACON\*\*\*\*\*RED\*ASH\*JACRED\*ASH\*JACDRACON\*\*\*\*\*DRAC  
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# MOSI

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 \*\*D\*\*\*A\*\*\*B\*GVウお\*w.あTIゑ…  
 \*VY\*\*A\*\*\*\*\*Aσ\*\*\*\*\*S\*\*\*\*\*A\*\*T4\*\*wqIk\*'tLWStVW\*Z\*\*\*\*\*u\*'s\*/\*\*\*9\*\*\*\*\*  
 \*\*\*\*\*R\*D\*A\*H\*  
 J\*CDR\*CON\*\*\*\*\*BRACON\*\*\*\*\*DRACGO\*\*\*\*\*PI\*CEY'\*\*\*'OAG\*AR\*A\*\*\*G  
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\*\*▶H'M\*H/M\*I:\*\*\*\*\* )\*\*\*\*DB\*\*\*\*\*B[BVウお\*wi\*(Iえ'm\*V\*\*\*Ag\*\*\*\*\*  
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