

# KRAMER ELECTRONICS Ltd.

## COMMUNICATION PROTOCOL FOR FC-7501

(VER-0.3 20/01/03)

RS-232 communication with the FC-7501 complies with the following protocol. The protocol uses 4 bytes of information, and data is at 9600 baud, with no parity, 8 data bits and 1 stop bit.

A null-modem RS-232 connection should be used between the PC (or other controller) and the FC-7501. That is, for a DB-9 port, connect as follows:

- Connect pin 5 of the PC to pin 5 of the machine.
- Cross pins 2 and 3, ie. connect pin 2 of the PC to pin 3 of the machine, and connect pin 3 of the PC to pin 2 of the machine.
- On the PC side, short pins 4 and 6.
- On the PC side, short pins 1, 7 and 8.

This protocol complements Kramer's "Protocol 2000" (Kramer's switcher protocol), so the two protocols can co-exist without disturbing one another. (According to Protocol 2000, the FC-7501 appears as machine number 22, so care should be taken not to set a switcher with this machine number).

### STRUCTURE OF PROTOCOL

<b>MSB</b>		<b>INSTRUCTION</b>						<b>LSB</b>	
0	TO PC	I5	I4	I3	I2	I1	I0		
7	6	5	4	3	2	1	0		

1<sup>st</sup> byte

		<b>DATA</b>							
1	D6	D5	D4	D3	D2	D1	D0		
7	6	5	4	3	2	1	0		

2<sup>nd</sup> byte

		<b>EXTENDED DATA</b>							
1	E6	E5	E4	E3	E2	E1	E0		
7	6	5	4	3	2	1	0		

3<sup>rd</sup> byte

		<b>MSB's</b>						<b>ADDR</b>
1	E7	D7	1	0	1	1	0	
7	6	5	4	3	2	1	0	

4<sup>th</sup> byte

Note that the MSB's of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte.

Terminology:

- TO PC is the "DESTINATION BIT"
- I4..I0 is the "INSTRUCTION"
- D7..D0 is the "DATA"
- E7..E0 is the "EXTENDED DATA"
- A0 is the "LSB of the MACHINE ADDRESS"

The destination bit, TO PC, is 0 when sending from the PC to the machine, or 1 when sending from the machine to the PC.

## **INSTRUCTION SET FOR THE FC-7501**

#	INSTRUCTION	I5	I4	I3	I2	I1	I0
0	Reset	0	0	0	0	0	0
1	Read video standard	0	0	0	0	0	1
2	Write video standard	0	0	0	0	1	0
3	Read front-panel switch (video format)	0	0	0	0	1	1
4	Press front-panel switch (video format)	0	0	0	1	0	0
5	Read video field rate	0	0	0	1	0	1
6	Force video standard	0	0	0	1	1	0
10	Write EEPROM data – low address	0	0	1	0	1	0
11	Read EEPROM data – low address	0	0	1	0	1	1
12	Write I <sup>2</sup> C	0	0	1	1	0	0
13	Read I <sup>2</sup> C	0	0	1	1	0	1
16	Error	0	1	0	0	0	0
20	Write EEPROM data – high address	0	1	0	1	0	0
21	Read EEPROM data – high address	0	1	0	1	0	1
57	Enable "Power-down save"	1	1	1	0	0	1
61	Identify machine	1	1	1	1	0	1

## **DESCRIPTION OF INSTRUCTIONS**

### INSTRUCTION 0 – RESET

DATA=0: initialize the machine.

When the machine is initialized, it will send the RESET code (DATA = 0). If the machine receives this code, it will reset to its "power-up" state.

DATA=1: configure the machine to its factory default state.

When the machine receives this code, all programmable parameters will be reset to their factory-default values.

EXTENDED DATA - set as 0.

### INSTRUCTION 1 – READ INPUT STANDARD

For sending to machine, set DATA = EXTENDED DATA = 0.

When replying:- DATA = INPUT STANDARD; EXTENDED DATA = 0.

The PC sends this instruction to the machine. The machine replies by sending back the INPUT STANDARD, defined as per the table below:

<b>STANDARD</b>	<b>E2</b>	<b>E1</b>	<b>E0</b>
NTSC (J, M)	0	0	0
PAL (B, G, H, I, N)	0	0	1
PAL-M	0	1	0
Combination PAL-N	0	1	1
NTSC 4.43	1	0	0
SECAM	1	0	1

#### INSTRUCTION 2 – WRITE VIDEO STANDARD

DATA = set as video standard (see table above). This is valid for CV and Y/C formats.

The PC sends the video standard to the machine. The standard is implemented, and the machine replies by sending the same data back to the PC.

Note that the machine should be set for "forced video standard" (instruction #6) if using this instruction, (since the unit will otherwise detect - and revert back to - the standard of the current video input).

#### INSTRUCTION 3 – READ FRONT-PANEL SWITCH (read format)

When sending to machine:- DATA, EXTENDED DATA - set as 0.

When replying:- DATA = front-panel switch number (0=CV, 1=Y/C, 2=Component); EXTENDED DATA = 0.

The PC sends this instruction to the machine. The machine replies by sending back a value relating to the current video format.

#### INSTRUCTION 4 – PRESS FRONT-PANEL SWITCH (select format)

DATA = front-panel switch number (0=CV, 1=Y/C, 2=Component).

EXTENDED DATA - set as 0.

- When the machine receives this instruction, it selects the new video format – as is done if the front-panel switch was pressed. If this results in a change in the video format, then the unit replies by sending the same data back to the PC.

#### INSTRUCTION 5 – READ FIELD RATE

When sending to machine:- DATA, EXTENDED DATA - set as 0.

When replying:- DATA=0 for 60Hz field rate; DATA=1 for 50Hz field rate; EXTENDED DATA=0.

The PC sends this instruction to the machine. The machine replies by sending back a value relating to the current video field rate.

#### INSTRUCTION 6 – FORCE VIDEO STANDARD

DATA = 0 to allow the unit to automatically detect and decode the input standard; DATA = 1 to force the unit to decode a video standard (see instruction #2). This instruction is valid for CV and Y/C formats.

The PC sends the data to the machine, and the machine replies by sending the same data back to the PC.

#### INSTRUCTION 10 & 20 – WRITE EEPROM DATA

DATA = EEPROM sub-address; EXTENDED DATA = data to be written to this sub-address.

The PC sends data directly to the EEPROM. The EEPROM stores this new value, and replies by sending the same data back to the PC.

CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behaviour of the machine.

#### INSTRUCTION 11 & 21 – READ EEPROM DATA

For sending to machine, DATA = EEPROM sub-address.

When replying:- DATA = EEPROM sub-address; EXTENDED DATA = requested data.  
The PC sends this instruction to the machine. The machine replies by sending back the data of this sub-address.

#### INSTRUCTION 12 – WRITE I<sup>2</sup>C

DATA = I<sup>2</sup>C sub-address; EXTENDED DATA = data to be written to this sub-address.

The PC sends I<sup>2</sup>C data (to the I<sup>2</sup>C address which was last accessed via INSTRUCTION 13).

The machine replies by sending the same data back to the PC.

CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behavior of the machine.

#### INSTRUCTION 13 – READ I<sup>2</sup>C

For sending to machine, DATA = I<sup>2</sup>C address; EXTENDED DATA = sub-address.

When replying:- DATA = sub-address; EXTENDED DATA = data read.

The PC sends this instruction to the machine. The machine replies by sending back the data of this address and sub-address.

#### INSTRUCTION 16 – ERROR

If the machine receives an invalid instruction, it replies by sending this error code.

#### INSTRUCTION 57 – ENABLE “POWER-DOWN SAVE”

DATA = 0 disables power-down saving; DATA = 1 enables saving. EXTENDED DATA - set to 0.

The PC sends this instruction to the machine. The power-down option is enabled or disabled according to the value of DATA. If the power-down option is enabled, then the machine will “remember” its state before being turned off, and revert to this state when turned on again.

Note that whenever the machine is turned on, the power-down save option is enabled.

#### INSTRUCTION 61 – IDENTIFY MACHINE

For sending, DATA = 1 to request machine name; DATA = 3 to request software version number. EXTENDED DATA - set to 0.

The PC sends this instruction to the machine. The machine replies as follows:

- if the machine name is requested, the machine replies with DATA = 75 (hex), and EXTENDED DATA = 01 (hex).
  - if the software version is requested, the machine replies with DATA as the version number before the decimal point, and EXTENDED DATA is the value following the decimal point. For example, for version 3.4, the machine replies with DATA = 03 (hex), and EXTENDED DATA = 04 (hex).
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