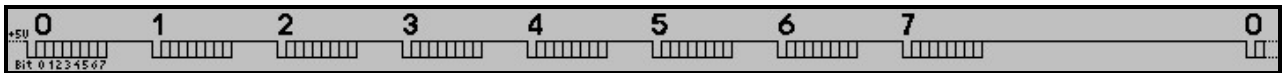
So funktioniert das SONY LANC(tm)-Protokoll

Die LANC(tm) Schnittstelle ist eine bidirektionale serielle open-collector Schnittstelle, auf der zwei Geräte miteinander kommunizieren können. Der Camcorder oder der Fotoapparat (hier heisst die Buchse ACC) erhält darüber Steuerbefehle und gibt seinen Status zurück.
Beim Camcorder kann man noch mehr Daten auslesen: Time Code, Data Code, Zählwerk, Restlaufzeit, Warnsignale und Laufwerksrückmeldungen.
LANC steht für Logic Application Control Bus System (aus einer Sony Information im April 1991 zur Einführung des "8mm Standard Time Code").
Der Master (also der Camcorder oder der Fotoapparat) gibt den Rahmen des Telegramms vor, indem er 8 Startbits generiert, denen jeweils 8 Bits (1 Byte) folgen. Anschliessend folgt ein (langes) Stopbit und das Spiel beginnt von vorn. Ein Bit hat die Länge von 104µs. Der Abstand zwischen zwei Startbits kann je nach Gerät zwischen 1200µs und 1400µs schwanken. Der Abstand zweier Telegramme beträgt 20ms für PAL/625 und 16,6ms für NTSC/525. Das Timing entspricht RS232 bei 9600 Baud.
Natürlich ist über die Schnittstelle auch der Service Mode einstellbar, ich gehe aber nicht darauf ein. Im Internet findet man dafür fertige Geräte zum Kauf.
Auch manche Camcorder der Firma Canon haben eine LANC-Buchse, allerdings reagieren diese Geräte nur auf wenige Befehle.

How SONY's LANC(tm) protocol works

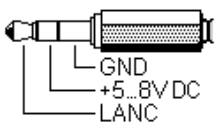
LANC(tm) is a bidirektional serial open collector communication port, where two devices can communicate with each other. The camcorder or still video camera (plug is called ACC here) is able to receive commands and sends back its status.
The camcorder provides even more data: time code, data code, counter, remain time, alerts and drive feedback.
LANC ist short for Logic Application Control Bus System (from a Sony information to the introduction of the "8mm Standard Time Code" in april 1991).
The master (camcorder or still video camera) generates the telegram frame, creating 8 startbits, followed each by 8 bits (1 byte) and a (long) stopbit. Then everything starts again.
One bit has a duration of 104µs.
The distance between two startbits can vary between 1200µs and 1400µs depending on the device.
The distance between two telegrams is 20ms for PAL/625 and 16.6ms for NTSC/525. The timing conforms to RS232 at 9600 Baud.
Of course also the service mode is accessable, but I won't enter into this. In the internet you will find ready-to-use devices to buy.
Some Canon camcorders also have a LANC-Plug, but only few commands are implemented.

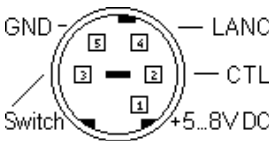


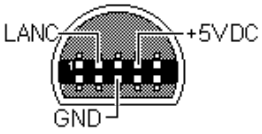
LANC protocol - timing diagram

Site navigation: [Byte 0] [Byte 1] [Byte 2/3] [Byte 4] [Byte 5] [Byte 6/7] [Links]

Connections:







Voltage depends on model and battery.
CTL signal only on some devices (VCR control signal).

Connect LANC Signal to GND for more

2.5 mm stereo Klinke / 2.5 mm stereo jack	Mini-DIN	A/V jack	than 140ms to power on (or on Mini-DIN Pin 3 to GND). Cable length can easily exceed 10m.
	Sicht auf Gerätebuchse	/ device jack view	

Ein Befehl ist erst nach 3...4 Telegrammen gültig.

Ausser LANC (CTRL-L) gibt es bei SONY die CTRL-S Schnittstelle und natürlich die Möglichkeit der IR Bedienung. Die Command-Codes sind überall die gleichen, bei CTRL-S und IR benötigt man noch einen Geräte-Code. Ausserdem sind die Codes verglichen mit LANC um ein Bit nach rechts verschoben.
SIRCS entspricht im Timing dem CTRL-S, aber SIRCS wird mit 40 kHz gepulst.

A command is valid after 3...4 telegrams.

Except LANC (CTRL-L) there is also a CTRL-S plug at some SONY devices and of course the infrared control. The command codes are the same, but for CTRL-S and IR you need an additional device code and they are shifted right one bit, compared to LANC.
SIRCS and CTRL-S have the same timing, but SIRCS is pulsed with 40 kHz.

Byte 0:

Sub-Command for Byte 1.

Binary code	Description
0001 1000	Normal command to VTR or video camera
0010 1000	Special command to video camera
0011 1000	Special command to VTR
0001 1110	Normal command to still video camera

"Low-Nibble": **Device Code**
"High-Nibble": **Guide Code**

Byte 1:

Sub-Command in Byte 0:	0001 1000 (bin)

The following table shows the actual Command-Codes to the device (Normal command to VTR or video camera). Only valid with the corresponding Sub-Command in Byte 0.

command (hex)	action
00	program 1
02	program 2
04	program 3
05	mode (only HDV/AVCHD)
06	program 4
08	program 5
0A	program 6

0C	program 7
0E	program 8
10	program 9
12	program 0 (10: SL-HF950 MKII)
14	program 11 (SL-HF950 MKII)
16	enter, program 12 (SL-HF950 MKII)
18	program 13
1A	program 14
1C	program 15
1E	program 16
20	program +
22	program -
24	
26	
28	x2
2A	mode movie/still (older models: power or viewfinder off)
2B	photo write
2C	eject
2E	main/sub
30	stop
32	pause
33	start/stop
34	play
35	tele (only CCD-V90)
36	rew
37	wide (only CCD-V90)
38	fwd
39	photo capture
3A	rec
3C	rec-pause (some devices)
3E	
40	still
42	
44	x1/10
46	x1/5 (sometimes: vis. scan)
48	
4A	x14
4C	x9
4E	tracking auto/manual
50	search -

52	search +
54	TV/VTR
56	
58	
5A	VTR
5B	date search / photo search / photo scan
5C	
5E	power off
60	rev frame
62	fwd frame
64	
65	edit-search -
66	x1
67	edit-search +
68	
69	rec-review (not i.e. TR-2200)
6A	
6C	sleep
6E	tracking normal
70	
72	
74	rew+play
76	
78	AUX
7A	slow +
7B	tape end search (HDV)
7C	slow -
7E	
80	
82	display mode
84	menu up
86	menu down
88	tracking/fine +
8A	tracking/fine -
8C	counter reset
8E	zero mem
90	index mark
92	index erase
94	shuttle edit +
96	shuttle edit -

98	data code or goto
99	data code or recording parameters
9A	menu
9C	
9E	input select
A0	
A2	execute
A4	quick timer
A6	index
A8	
AA	
AC	index search +, date search 01 (HDV)
AE	index search -, date search -01 (HDV)
B0	tape speed
B2	goto zero / tape return (not DV)
B4	counter display, data screen
B6	open/close (SL-HF950), replay (FauHaEss)
B8	timer display
BA	
BC	
BD	date display off
BE	
BF	date display on
C0	timer set
C2	menu right, next
C4	menu left
C6	timer clear
C8	timer check
CA	timer record
CC	
CE	
D0	audio dub
D2	
D4	edit assemble
D6	edit mark
D8	synchro edit
DA	
DC	digital off (VCR), print (DV)
DE	speed +
E0	speed -

E2	stop motion
E4	
E6	
E8	channel scan / flash motion
EA	
EC	voice boost
EE	
F0	
F2	
F4	
F6	
F8	digital scan
FA	high-speed-rew
FC	still/shuttle (EV-S880)
FE	

Sub-Command in Byte 0:	**0010 1000 (bin)**

The following table shows the actual Command-Codes to the device (Special command to video camera). Only valid with the corresponding Sub-Command in Byte 0.

command (hex)	**action**
00	variable speed zoom Tele: slowest speed
02	variable speed zoom Tele: faster than 00
04	variable speed zoom Tele: faster than 02
06	variable speed zoom Tele: faster than 04
08	variable speed zoom Tele: faster than 06
0A	variable speed zoom Tele: faster than 08
0C	variable speed zoom Tele: faster than 0A
0E	variable speed zoom Tele: fastest speed
10	variable speed zoom Wide: slowest speed
12	variable speed zoom Wide: faster than 10
14	variable speed zoom Wide: faster than 12
16	variable speed zoom Wide: faster than 14
18	variable speed zoom Wide: faster than 16
1A	variable speed zoom Wide: faster than 18
1C	variable speed zoom Wide: faster than 1A
1E	variable speed zoom Wide: fastest speed
21	grid (AVCHD)
25	fader
27	rec start (DV, some cameras)

29	rec stop (DV, some cameras)
30	variable speed zoom Tele (avoiding digital zoom, some cameras): slowest speed
32	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 30
34	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 32
35	Zoom Tele slow (working all cameras since approx. 1996)
36	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 34
37	Zoom Wide slow (working all cameras since approx. 1996)
38	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 36
39	Zoom Tele fast (working all cameras since approx. 1996)
3A	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 38
3B	Zoom Wide fast (working all cameras since approx. 1996)
3C	variable speed zoom Tele (avoiding digital zoom, some cameras): faster than 3A
3E	variable speed zoom Tele (avoiding digital zoom, some cameras): fastest speed
41	Auto-Focus on/off (not if there is a real switch at the camera)
45	Focus manual far
47	Focus manual near
49	White balance toggle (only cameras until approx. 1996)
4B	Backlight (not DV)
51	Backlight (DV)
53	Exposure auto/man. toggle (models of the early 90's) Iris more close
55	Iris more open
61	Shutter (models of the early 90's)
77	White balance reset (not if white balance is selected via menu)
85	Memory impose (models of the early 90's)
87	Color / Mode (models of the early 90's)
89	Superimpose (models of the early 90's)
AF	Iris auto

Sub-Command in Byte 0:	**1101 1000 (bin)**

The following table shows the actual Command-Codes to the device (command to video camera recording to SD-Card). Only valid with the corresponding Sub-Command in Byte 0.

command (hex)	action

00	start/stop
01	mode movie/still
02	photo write
03	power off
05	menu
09	execute
0B	menu right
0C	photo capture
0D	menu left
0F	menu up
11	menu down
17	data screen

Sub-Command in Byte 0:	**0001 1110 (bin)**

The following table shows the actual Command-Codes to the device (Normal command to still video camera). Only valid with the corresponding Sub-Command in Byte 0.

command (hex)	action
01	variable speed zoom Tele: slowest speed
03	variable speed zoom Tele: faster than 01
05	variable speed zoom Tele: faster than 03
07	variable speed zoom Tele: faster than 05
09	variable speed zoom Tele: faster than 07
0B	variable speed zoom Tele: faster than 09
0D	variable speed zoom Tele: faster than 0B
0F	variable speed zoom Tele: fastest speed
11	variable speed zoom Wide: slowest speed
13	variable speed zoom Wide: faster than 11
15	variable speed zoom Wide: faster than 13
17	variable speed zoom Wide: faster than 15
19	variable speed zoom Wide: faster than 17
1B	variable speed zoom Wide: faster than 19
1D	variable speed zoom Wide: faster than 1B
1F	variable speed zoom Wide: fastest speed
52	photo preview
58	photo save (or in movie mode: start-stop)
5E	power off
94	Zoom Tele slow
96	Zoom Wide slow

98	Zoom Tele fast
9A	Zoom Wide fast

Byte 2 / 3:

The significant **Guide Code** for Byte 3 is found in the "High-Nibble" of Byte 2.
The following table shows the known codes for video cameras.
Some cameras show up a sort of ID in Byte 2 and 3, but I did not find any systematic order.
Has anybody an idea concerning the meaning of these values?

Guide Code	Description	Byte 3, L-N	Byte 3, H-N
9	channel / tuner	AV or OFF: 1010 channel: One's No Tuner: 0000 and H-N 0000	AV or OFF: 1010 channel: Ten's (at 0: 0000 or 1010) No Tuner: 0000 and L-N 0000
A	channel / tuner	AV or OFF: 1010 channel: Hundred's No Tuner: 0000	Tuner-Type 1: 00 Tuner-Type 2: 01 Tuner-Type 3: 10

Byte 4:

Status-Code from the connected device (video camera).

L-N H-N	0	1	2	3	4	5	6	7	8
0	initial	is eject	stop	fwd	rec		play	play/pause fwd	AL insert
1		dew cass. out	load		rec/ pause			frame fwd	AL ins-pause
2		ejecting	cassette busy		timer-rec		x1 fwd	1/5 fwd	AR insert
3		unload	low-battery	go zero/play f.	timer-rec s.		x1 rev	1/5 rev	AR ins-pause
4			dew stop	fwd mem stop	AV insert		cue	1/10 fwd	AL+V insert
5			emergency		AV ins.-pause		rev	1/10 rev	AL+V ins-ps
6			tape end		video insert		x2/x3 fwd	frame fwd	AR+V insert
7			tape top		video ins.-ps		x2/x3 rev	frame rev	AL+R ins-ps
8				rew	audio dub	edit search+	x9 fwd		
9			stp after zero		a.dub pause	edit search-	x9 rev	play/pause rev	
A			load emer.	auto-play	cam rec	edit-s fwd	frame sea. cue		
B		unload emerg.	stop emerg. 1	go zero/play r.	cam stby	edit-s rev	frame sea. rev		
C			stop emerg. 2	rew mem stop			x14 fwd		
D				hi-speed rew			x14 rev		
E			stop NC						

F						edit pause			

Status-Code from the connected device (still video camera).

L-N H-N	**0**	**D**	**E**
0	initial		
D			mpeg movie mode
E			photo mode
F		play mode	setup mode

Byte 5:

Bit	Description
0	1 = invalid transmitted code
1	1 = rec protection (old models: tape pre-end)
2	1 = battery low
3	1 = zero mem / zero found
4...7	**Guide Code** for Byte 6 and 7

Byte 6 / 7:

The significant **Guide Code** for Byte 6 and 7 is found in the "High-Nibble" of Byte 5.
The following table shows the known codes.

Guide Code	Description	Byte 6, L-N	Byte 6, H-N	Byte 7, L-N	Byte 7, H-N
0					
1	Status V8 and Hi8	0+1: tape speed 00=SP, 01=LP 2: standard FM-sound 3: PCM-sound	0: camera-mode 1: rec protection / tape pre-end 2: ME (0=MP) 3: 13µm (0=10µm)	0: 1: camera-mode 2: 3: servo / mechanics on	0+2: input select (00=tuner, 01=sim, 11=line)
2	decimal Counter	One's	Ten's	Hundred's	Thousand's
3	real time Counter, picture Counter	Seconds One's, Picture One's	Seconds Ten's, Picture Ten's	Minutes One's, Picture Hundred's	Minutes Ten's, Picture Thousand's
4	real time Counter	Hours One's	Hours Ten's	Frames One's or Day One's (or 0000/1111) ("Day" only seen in CCD-V90E!)	0+1: Frames Ten's or Day Ten's 2: RCTC 3: sign (1=negativ) (or 0000/1111)
5	remain time	Minutes One's	Minutes Ten's	Hours One's	2: 0=calculating (old devices: 1111)
6					
7	Status Betamax or DV	Betamax: 0+1: tape speed 00=BI, 01=BII, 10=BIII 2: Beta Hifi 3: servo/ mechanics on DV: 0+1: tape-speed 00=SP, 01=LP	0: 0=Betamax, 1=DV 1: rec protection 2+3: Byte 7 DV mode: 00=DV input 01=ext. Status DV in a Camera 10= 11=ext. Status DV in a VTR	Betamax: 0+1: Audio L+R insert 2: Video insert 3: assemble DV mode 00: input tuner: 0000, input Line: 0101, input DV: 1010 DV mode 01:	Betamax: 0: edit 1: preview 2: EE 3: DV mode 00: Line 1: 0000 Line 3: 1010 Line 2: 0101 Line 4: 1111

		2: audio (0=12bit, 1=16bit) 3: servo / mechanics on		mode: 0000=player, 0011=camera	
8	Data Guide	DC: 4	DC: 1	DC: 3=Date, 4=Time	DC: 0
9	Data-Code (Tape + Picture)	Date: Year One's Time: Hour One's	Date: Year Ten's Time: Hour Ten's	Date: Month One's Time: Minutes One's	Date: Month Ten's Time: Minutes Ten's
A	Data-Code (Tape + Picture)	Date: Day One's Time: Seconds One's	Date: Day Ten's Time: Seconds Ten's	DC: 1111 sometimes 1000	DC: 1111 sometimes 1001/1011
B	Status AVCHD	0: 1=AVCHD camera mode 1: 1=AVCHD photo mode	0000	0000	0000
C	Status Hi8, DV (+GC1)	Hi8: 0100 DV: 0010 or 0001	Hi8: 0100 DV: 0010 or 0000	0: camera mode / CTL found 1: 2: edit on 3: auto Hi8	0000
D					
E	Status Photo	0: 1=photo mode selected 1: 1=memorystick(tm) inserted 2: 1=memorystick(tm) write-protected	0: 1=memorystick(tm) play 1: 1=memorystick(tm) search 2: 1=memorystick(tm) full 3: 1=camera with memorystick(tm)	0: 1=photo mode available	
F					

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legend:

location - world wide web

location - global position

communication - electronic mail

communication - line

communication - cell

communication - snail mail

location - geo address

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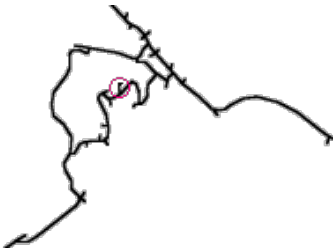

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