Article 13421 of sci.electronics:
From: dba@jet.uk (dennis armstrong)
Subject: Re: Seeking IR remote control specifications
Keywords: IR remote control
Date: 10 Jan 92 16:37:14 GMT

In <1991Dec31.192937.6621@techbook.com> rjk@techbook.com (Robert Kelly) writes:

>I know there are a number of different systems for the
>infrared remote control of consumer electronics, for
>example video equipment, but I would like to try building
>some infrared-related gadgets and any information would
>be helpful. What I'm looking for is timing information,
>control code definitions, etc.

The January 1992 issue of Elektor Electronics magazine (UK) has a construction project to build a universal RC5 code infra-red receiver.

The RC5 code set was developed by Phillips and allows 2048 commands to be transmitted divided into 32 addressable groups of 64 commands each.
The transmitted code consists of a 14 bit dataword of the following structure.
  2 run-in bits to adjust the AGC level in the receiver IC
  1 check bit
  5 system address bits
  6 command bits.

These have been assigned as follows:

System address	Equipment
0	TV set
2	Teletext
5	Video recorder
7	experimental
16	preamplifier
17	receiver/tuner
18	tape/cassette recorder
19	experimental

Command code	Function
0-9	0-9
12	standby
13	mute
14	presets
16	volume +
17	volume -
18	brightness +
19	brightness -
20	colour saturation +
21	colour saturation -
22	bass +
23	bass -
24	treble +
25	treble -
26	balance right
27	balance left
48	pause
50	fast reverse
52	fast forward
53	play
54	stop
55	record
63	system select

The basic timing is derived from a 36KHZ oscillator.
The code is transmitted in biphase format. In this system, a logic 1 is transmitted as a half bit time without signal, followed by a half bit time with signal. A logic 0 has exactly the opposite structure. Each half bit consists of 32 shorter pulses. Each transmitted bit has a length of 1.778 msec, the shorter pulses have a pulse width of 6.9444 usec on time and 20.8332 usec off time. A complete dataword has a length of 24.889 msec, and is always transmitted completely. If the key is held pressed the code is repeated in intervals of 64 bit times (ie 113.778 msec).

The project uses the following ICs SAA3049 and TDA3048 in the receiver.

Transmitters use the following ICs SAA3006, SAA3010 and SAA3027.

You should be able to obtain spec sheets for these from your local Phillips
or Signetics (USA) chip suppliers.

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TN5 7HE
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Hope this helps.

From: tchannon@black.demon.co.uk (Tim Channon)
Newsgroups: sci.electronics
Subject: Plans for serial-driven IR remote controller (finally!)
Date: 12 Jun 92 21:29:45 GMT

I'm not quoting that article!

Why no mention of RC5?

There is a list of codes allocated by the remote control committee, some
mandatory, some not.

14 bit data word.
2 start bits for agc etc.
1 control bit to indicate a new transmission
5 system address bits
6 command bits

Bit period 1.778ms, repeat interval 64 bit periods 113.778ms

A one is a rising edge, a zero a falling edge (ignoring carrier).

Data transmitted msb first.

I'm not typing in all those codes!
CD seems to be sys addr 20.

Numbers 0..9 are codes 0..9, pause 48, stop 54, select system 63.

  TC.

From: adam@microware.com (Adam Goldberg)
Newsgroups: sci.engr,sci.engr.advanced-tv,rec.video,sci.electronics
Subject: Re: IR Remotes
Date: 5 Oct 93 14:00:28 GMT

In <CEDwtB.9JG@cs.uiuc.edu> eolson@cs.uiuc.edu (Eric Olson) writes:

>singer@ll.mit.edu (Matthew R. Singer) writes:

>>Remote controls for TVs and VCRs appear to use sets of standard codes,
>>or so one would judge from the way things like VCR Plus and generic
>>controllers work.

>I got one of the Radio Shack (sharp GP1U52X) IR detector modules.
>I hooked the output to a scope and shot several of my Sony & Magnovox
>remotes at it. I got a 12 bit pulse width modulated signal out.
>on for 500ns, then off for 750ns (logic 0) or 1250ns (logic 1) for each bit.
>So the remotes must take a 12 bit number, pulse width modulate it, then
>modulate it with the 40KHz carrier and blink it out the IR LED.
>(always wanted to make a card for my PC to read it in- someday....)

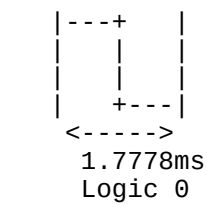
I am currently looking in to building a box which can send/receive IR

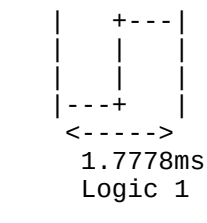
remote signals, hopefully I can send it commands via RS232 to, say, turn on the TV, etc.

I received from Philips a set of data books 'Semiconductors for Television and Video Systems' (3 books, books IC02a through IC02c), and a photocopied article on IR remote signals.

There seem to be two schemes for IR remotes: RC-5 (Philips-type), and NEC type. All I can really explain is the RC-5, because thats what I have in front of me.

Bits are transmitted on a trailing edge, ie (pardon the ASCII)





Each RC-5 code word is 14 bits, in the following format: 2 start bits, the first is always 1, the second is a field bit denoting command codes 0-63 (logical 1) or 64-127 (logical 0). 1 control bit which toggles after each key release and initiates a new transmission (ie, if you type 5, 5 on the first five this will be z, on the second !z, to differentiate the second keystroke from just a retransmission of the first), 5 system address bits for selecting one of 32 possible systems listed in table 1. 6 command bits representing one of the 128 possible RC-5 commands listed in the tables at the end of the publication.

"Before transmission via the IR LED, the HIGH period of each 1.778ms symbol is modulated at 36kHz with a duty factor of 0.25. Each half-symbol period which is HICH therefore contains 32 pulses with an on-time of 6.944us and a repetition period of 27.777us."

excerpts from table 1:

System #	Description:
0	TV1
1	TV2 (descrambler tuner)
3	TV1 or TV2 (commands 0-63 or 64-127)
5	VCR1
6	VCR2
16	Audio preamp
17	tuner
23	DAT

Command excerpts for a TV:

Command:	Description
16	Volume +
17	volume -
88	pip on/off
89	pip shift
90	pip/main swap
94	3/9 multiscan (search for 9 TV pictures and display in 9 pips)

and on and on and on.

Adam

PS: If anyone is interested in collaborating, this is what I have in mind to build:

A box with on RS232 port, an IR receiver and IR transmitter. It should probably have some intelligence on board. It can receive signals from a remote (to program it, probably), and send some sort of identification of what it received to the host via RS232. It can then receive this identification back via the RS232 and transmit it.

The idea is to be able to demonstrate to the box what signal means what, then have the computer on the other end of the RS232 be able to turn the TV on/off when on vacation, etc.

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Adam G.
adamg@microware.com, or ...!uunet!mcrware!adamg