MIDI PROTOCOLS FOR TC2290 by TC ELECTRONIC

for software PROM version DD28V90 (sampling 2)

(this information is for experienced programmers only)

CONTENTS:

and

Owners manual addition, chapter 8.1.9 :
Preset/parameter dumps between two TC2290's

t.c.electronic

T.C.ELECTRONIC OF DENMARK A/S
(WEST GERMANY)
AN DER MOSEBECKE 1
D-4930 DETMOLD
TEL: 05231/32972
FAX: 05231/39411
AUTO: 01611512756

September 1989

Please Note:

This document describes the TC2290 SYSEX implementation.
TC Electronic cannot offer support on integration of the TC2290 in a remote control system.

1. GENERAL INFORMATION ABOUT THE MIDI EXCLUSIVE PROTOCOLS:

TC ID NO. : 33hex = 51dec = 00110011bin
TC DEVICE NO. : variable (factory default value : 00)
DATA TYPES:

0	: 2290 illegal
1	: 2290 front dump total
2	: 2290 front dump partial
3	: 2290 preset dump request
4	: 2290 preset dump (one preset)
5	: 2290 keycode dump
6	: 2290 special no. dump
7	: 2290 front dump total request
8	: 2290 front dump partial request
9	: 2290 special no. dump request
10	: 2290 keycode o/p enable/disable

KEYCODE DUMP:

Internally the TC2290 generates a KEYCODE every 20 mS. Every time a key is pressed, the KEYCODE number for this key is generated once. If a key is held for more than 20 mS, the KEYCODE "HOLDKY" (#254dec) is generated every 20 mS. When the key is released (i.e. no keys pressed), an "OFFKEY" (#255dec) is generated every 20 mS.

These keycodes will result in a MIDI exclusive output if certain conditions are met. The conditions are that the TC2290 special parameter MIDI EXCL. OUT (special no.3) is set to 0 and EXCL.
KEYCODE OUT is enabled (i.e. special no 116 = 1).

Due to the heavy amount of "OFFKEY"s generated even at 'standby', a limiter has been inserted that stops the MIDI exclusive "OFFKEYS"-traffic after a few seconds. Also the KEYMODE protocol leaves room for 'packaging' equal keycodes in packages (up to 120) to reduce the MIDI exclusive line traffic.

The major reason for the "HOLDKY" and "OFFKEY"s is to ensure that a 'MIDI-slaved' TC2290 through MIDI-IN will track it's master TC2290, when using the **<UP/DOWN>** functions. I.e. the number of **<HOLDKEY>**'s decides the increments/decrements to be made.
The timed function **<LEARN>** for setting delaytime increments 20 mS for each received **<HOLDKY>** or **<OFFKEY>**.
If controlling the TC2290 through keycode commands in sample mode, at least one **<OFFKEY>** is necessary after the **<LEARN>** (TRIG) key and after the sample period has expired to enable correct display increment as well as after **<KEY A>** (record/playback) (check if any other key).

After a **<PRESET>** **<NUMBER>** **<ENTER>** sequence (or after a received MIDI preset (program) change command) at least two **<OFFKEY>** sequences should be sent.

(Another version of the DD28V90 PROM exists, DD28V91, that does not need the externally generated **<OFFKEY>**'s (except one after a preset change) to simplify the external KEYCODE control of the TC2290, however the PROM is not suitable for up/down keys control in a master/slave configuration of two TC2290's).

Keycode dump, earlier PROM versions:
Practically all previous TC2290 software versions 26.XX to 30.XX have the keycode dump facility. See chapter 8.1.7. and 2290apn.07. However the protocol differs in that the

DATATYPE parameter is not present.

Preset dump request and dump:

A preset dump request to a 2290 will result in the return of the content of the preset. Preset no. 100 is used for the active front parameters.

Front dump total request and dump:

The front dump possibility is meant to help make an external simulation of the frontpanel. The status of all frontpanel displays and LED's is returned after a request has been detected.

Front dump partial request and dump:

The partial front dump delivers only display/LED changes. (To limit MIDI traffic).

Special no. dump request and dump:

A special no. dump request will result in the return of the special no. settings. - The special parameters which are 'in preset' as well as some other are not returned. See below.

Keycode output enable/disable.

A command the external editing device can send to disable the TC2290 sending keycodes. (To minimize MIDI traffic).

About all externally generated requests/dumps:

For the TC2290 to accept and respond to a request or a dump :

MIDI ENABLE must be on
EXCL IN/OUT must be enabled (SPEC#2 & 3)
Correct TC ID & DEVICE NO. must be specified (spec#1 & 110)
Proper format and no checksum errors are present
No other conditions are necessary for the TC2290 to receive an externally generated dump at any time.

Only limited range checks on parameters are performed i.e. take care not to exceed the ranges given.
If a started request/dump is not finished, or improper format, it might be necessary to power off/on the TC2290.

2. PROTOCOLS:

KEYCODE DUMP:

byte 1:	11110000B	exclusive dump start
byte 2:	00110011B	tc ID no.

byte 3: 0xxxxxxxB tc device no.
byte 4: 00000101B data type

byte 5: 0000xxxxB keycode msd.
byte 6: 0000xxxxB keycode lsd.
byte 7: 0xxxxxxxB eventual data counter

byte 7 or 8:
11110111B exclusive end

FRONT DUMP TOTAL:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc id no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00000001B tc data type

byte 5: 0000xxxxB x1000 delay
byte 6: 0000xxxxB feedback msd.
byte 7: 0000xxxxB x100 delay
byte 8: 0000xxxxB feedback lsd.
byte 9: 0000xxxxB x10 delay
byte 10: 0000xxxxB output msd.
byte 11: 0000xxxxB x1 delay
byte 12: 0000xxxxB output lsd.
byte 13: 0000xxxxB preset msd.
byte 14: 0000xxxxB mod msd.
byte 15: 0000xxxxB preset lsd.
byte 16: 0000xxxxB mod lsd.

byte 17: 0000xxxxB bit 0 : DYN MOD.
bit 1 : FEEDBACK DISPLAY COMMA
bit 2 : MIDI ENABLE
bit 3 : MODULATION VIEW DYN

byte 18: 0000xxxxB bit 0 : FEEDBACK VIEW LOW
bit 1 : FEEDBACK INV.
bit 2 : PAN DIR.
bit 3 : FEEDBACK GREEN LED

byte 19: 0000xxxxB bit 0 : DELAY DISPLAY COMMA 88.88
bit 1 : MODULATION WAVE FORM ENV
bit 2 : PRESET GREEN LED
bit 3 : MODULATION VIEW PAN

byte 20: 0000xxxxB bit 0 : FEEDBACK VIEW HIGH
bit 1 : -20DB PPM
bit 2 : PAN DELAY
bit 3 : OUTPUT GREEN LED

byte 21: 0000xxxxB bit 0 : DELAY ON
bit 1 : MODULATION WAVEFORM RAND
bit 2 : EXT EFFECTS GREEN LED
bit 3 : MODULATION VIEW DLY

byte 22: 0000xxxxB bit 0 : FEEDBACK VIEW LEVEL
bit 1 : -10DB PPM
bit 2 : SAMPLE
bit 3 : DELAY DISPLAY COMMA 888.8

byte 23: 0000xxxxB bit 0 : MODULATION DISPLAY COMMA .88
bit 1 : MODULATION WAVEFORM SINE
bit 2 : KEY B
bit 3 : S.VAL

byte 24: 0000xxxxB bit 0 : OUTPUT VIEW PAN
bit 1 : -3DB PPM
bit 2 : DELAY MOD
bit 3 : DELAY GREEN LED

byte 25: 0000xxxxB bit 0 : PAN MOD
bit 1 : MODULATION DISPLAY COMMA 8.8
bit 2 : KEY A
bit 3 : ERR

byte 26: 0000xxxxB bit 0 : OUTPUT VIEW DIRECT
bit 1 : 0 DB PPM
bit 2 : DYN REVERSE
bit 3 : MODULATION DEPTH GREEN LED

byte 27: 0000xxxxB bit 0 : TIME
bit 1 : MODULATION WAVEFORM TRIG.
bit 2 : SYS
bit 3 : S.NO.

byte 28: 0000xxxxB bit 0 : OUTPUT VIEW DELAY
bit 1 : +3 DB PPM
bit 2 : OUTPUT INV.
bit 3 : MODULATION SPEED GREEN LED

byte 29: 0000xxxxB bit 0 : EXT EFF 2
bit 1 : EXT EFF 3
bit 2 : EXT EFF 4
bit 3 : EXT EFF 5

byte 30: 0000xxxxB bit 0 : not used
bit 1 : MODULATION OSC./THRESHOLD LED
bit 2 : MIDI CHANNEL
bit 3 : EXT EFF 1

byte 31: 0xxxxxxxB checksum, (add bytes 5-30, zero bit 7)

byte 32: 11110111B exclusive end.

FRONT DUMP PARTIAL:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc ID no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00000010B tc data type

byte 5: 0xxxxxxxB data pointer

byte 6: 0000xxxxB data msd.
byte 7: 0000xxxxB data lsd.

byte 8: 0xxxxxxxB checksum, (add bytes 5-7, zero bit 7)

byte 9: 11110111B exclusive end.

PRESET DUMP REQUEST:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc ID no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00000011B tc data type
byte 5: 0xxxxxxxB preset no.
byte 6: 11110111B exclusive end.

PRESET DUMP:

byte 01: 11110000B exclusive dump start
byte 02: 00110011B tc ID no.
byte 03: 0xxxxxxxB tc device no.
byte 04: 00000100B tc data type
byte 05: 0xxxxxxxB preset no.
byte 06: 0xxxxxxxB no. of data bytes/preset
(For DD28V9X : 57 bytes/preset which results in twice as many 'nibbles' (0000xxxxB) transmitted.)
format: 0000mmmmB data msd
00001111B data lsd

DLYTIM: byte 07: 0000mmmmB byte 08: 00001111B
byte 09: 0000mmmmB byte 10: 00001111B
FBKGA: byte 11: 0000mmmmB byte 12: 00001111B
HFCUT: byte 13: 0000mmmmB byte 14: 00001111B
LFCUT: byte 15: 0000mmmmB byte 16: 00001111B
FBKDS: byte 17: 0000mmmmB byte 18: 00001111B
DLYGA: byte 19: 0000mmmmB byte 20: 00001111B
DIRGA: byte 21: 0000mmmmB byte 22: 00001111B

VOLGA: byte 23: 0000mmmmB byte 24: 00001111B
POSIT: byte 25: 0000mmmmB byte 26: 00001111B
OUTDS: byte 27: 0000mmmmB byte 28: 00001111B
PANCS: byte 29: 0000mmmmB byte 30: 00001111B
DLYSP: byte 31: 0000mmmmB byte 32: 00001111B
byte 33: 0000mmmmB byte 34: 00001111B
PANSP: byte 35: 0000mmmmB byte 36: 00001111B
byte 37: 0000mmmmB byte 38: 00001111B
DYNSP: byte 39: 0000mmmmB byte 40: 00001111B
byte 41: 0000mmmmB byte 42: 00001111B
DLYDP: byte 43: 0000mmmmB byte 44: 00001111B
PANDP: byte 45: 0000mmmmB byte 46: 00001111B
DYNDP: byte 47: 0000mmmmB byte 47: 00001111B
DLYTH: byte 49: 0000mmmmB byte 50: 00001111B
PANTH: byte 51: 0000mmmmB byte 52: 00001111B
DYNTH: byte 53: 0000mmmmB byte 54: 00001111B
FBKTH: byte 55: 0000mmmmB byte 56: 00001111B
DLYMM: byte 57: 0000mmmmB byte 58: 00001111B
PANMM: byte 59: 0000mmmmB byte 60: 00001111B
DYNMM: byte 61: 0000mmmmB byte 62: 00001111B
MODDS: byte 63: 0000mmmmB byte 64: 00001111B
DLYMF: byte 65: 0000mmmmB byte 65: 00001111B
PANMF: byte 67: 0000mmmmB byte 66: 00001111B
DYNMF: byte 69: 0000mmmmB byte 70: 00001111B
OPIVF: byte 71: 0000mmmmB byte 72: 00001111B
FBIVF: byte 73: 0000mmmmB byte 74: 00001111B
DLYON: byte 75: 0000mmmmB byte 76: 00001111B
DYRFL: byte 77: 0000mmmmB byte 76: 00001111B
SAMFL: byte 79: 0000mmmmB byte 80: 00001111B
DLRFL: byte 81: 0000mmmmB byte 82: 00001111B
BPMTH: byte 83: 0000mmmmB byte 84: 00001111B
EXTEF: byte 85: 0000mmmmB byte 86: 00001111B
PBFRNT: byte 87: 0000mmmmB byte 88: 00001111B
byte 89: 0000mmmmB byte 90: 00001111B
RCFRNT: byte 91: 0000mmmmB byte 92: 00001111B
byte 93: 0000mmmmB byte 94: 00001111B
PBREAR: byte 95: 0000mmmmB byte 96: 00001111B
byte 97: 0000mmmmB byte 98: 00001111B
RCREAR: byte 99: 0000mmmmB byte100: 00001111B
byte101: 0000mmmmB byte102: 00001111B
FRNTON: byte103: 0000mmmmB byte104: 00001111B
MTBEAT: byte105: 0000mmmmB byte106: 00001111B
byte107: 0000mmmmB byte108: 00001111B
PPITCH: byte109: 0000mmmmB byte110: 00001111B
byte111: 0000mmmmB byte112: 00001111B
NXTPRE: byte113: 0000mmmmB byte114: 00001111B
SEQCNT: byte115: 0000mmmmB byte116: 00001111B
CFTIME: byte117: 0000mmmmB byte118: 00001111B
byte119: 0000mmmmB byte120: 00001111B

byte121 0ccccccB checksum, (add bytes 5-120, zero bit 7)

byte122 11110111B exclusive end command

SPECIAL NO. DUMP:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc ID no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00000110B tc data type

RPITCH: byte 5: 0000mmmmB byte 6: 00001111B
byte 7: 0000mmmmB byte 8: 00001111B
PSAVE: byte 9: 0000mmmmB byte 10: 00001111B
byte 11: 0000mmmmB byte 12: 00001111B
PROPR: byte 13: 0000mmmmB byte 14: 00001111B
LOCKON: byte 15: 0000mmmmB byte 16: 00001111B
MIDIEN: byte 17: 0000mmmmB byte 18: 00001111B
MIDICH: byte 19: 0000mmmmB byte 20: 00001111B
MIDIOM: byte 21: 0000mmmmB byte 22: 00001111B
SRMINS: byte 23: 0000mmmmB byte 24: 00001111B
SRMMAX: byte 25: 0000mmmmB byte 26: 00001111B
byte 27: 0000mmmmB byte 28: 00001111B
DLYMAX: byte 29: 0000mmmmB byte 30: 00001111B
byte 31: 0000mmmmB byte 32: 00001111B
SAMMAX: byte 33: 0000mmmmB byte 34: 00001111B
byte 35: 0000mmmmB byte 36: 00001111B
SRXEND: byte 37: 0000mmmmB byte 38: 00001111B
byte 39: 0000mmmmB byte 40: 00001111B
SAXEND: byte 41: 0000mmmmB byte 42: 00001111B
byte 43: 0000mmmmB byte 44: 00001111B
SAXERE: byte 45: 0000mmmmB byte 46: 00001111B
byte 47: 0000mmmmB byte 48: 00001111B
PLYTH: byte 49: 0000mmmmB byte 50: 00001111B
RECTH: byte 51: 0000mmmmB byte 52: 00001111B
STHYS: byte 53: 0000mmmmB byte 54: 00001111B
STXHYS: byte 55: 0000mmmmB byte 56: 00001111B
SPNROL: byte 57: 0000mmmmB byte 58: 00001111B
LUSRER: byte 59: 0000mmmmB byte 60: 00001111B
USRERR: byte 61: 0000mmmmB byte 62: 00001111B
LFATER: byte 63: 0000mmmmB byte 64: 00001111B
FATERR: byte 65: 0000mmmmB byte 66: 00001111B
FERRPS: byte 67: 0000mmmmB byte 68: 00001111B
byte 69: 0000mmmmB byte 70: 00001111B
PRENO: byte 71: 0000mmmmB byte 72: 00001111B
SPNSYS: byte 73: 0000mmmmB byte 74: 00001111B
PEXFDS: byte 75: 0000mmmmB byte 76: 00001111B
PVGADS: byte 77: 0000mmmmB byte 78: 00001111B
PDGADS: byte 79: 0000mmmmB byte 80: 00001111B
PDONDS: byte 81: 0000mmmmB byte 82: 00001111B
PSAMDS: byte 83: 0000mmmmB byte 84: 00001111B
TCEXID: byte 85: 0000mmmmB byte 86: 00001111B
EXIPDS: byte 87: 0000mmmmB byte 88: 00001111B
EXOPDS: byte 89: 0000mmmmB byte 90: 00001111B
DIBPGA: byte 91: 0000mmmmB byte 92: 00001111B
AKASTG: byte 93 0000mmmmB byte 94: 00001111B
.... etc.
byte109: 0000mmmmB byte110: 00001111B
AKBSTG: byte111: 0000mmmmB byte112: 00001111B
.... etc.
byte127: 0000mmmmB byte128: 00001111B

AKCSTG: byte129: 0000mmmmB byte130: 00001111B
.... etc.
byte145: 0000mmmmB byte146: 00001111B
AKDSTG: byte147: 0000mmmmB byte148: 00001111B
.... etc.
byte163: 0000mmmmB byte164: 00001111B
AKESTG: byte165: 0000mmmmB byte166: 00001111B
.... etc.
byte181: 0000mmmmB byte182: 00001111B
AKFSTG: byte183: 0000mmmmB byte184: 00001111B
.... etc.
byte199: 0000mmmmB byte200: 00001111B
WAITM2: byte201: 0000mmmmB byte202: 00001111B
byte203: 0000mmmmB byte204: 00001111B
WDLYON: byte205: 0000mmmmB byte206: 00001111B
WVOLGA: byte207: 0000mmmmB byte208: 00001111B
WDIRGA: byte209: 0000mmmmB byte210: 00001111B
WEXTEF: byte211: 0000mmmmB byte212: 00001111B
LASTPN: byte213: 0000mmmmB byte214: 00001111B
TCEXDV: byte215: 0000mmmmB byte216: 00001111B

byte217: 0ccccccB checksum, (add bytes 5-216, zero bit 7)
byte218: 11110111B exclusive end command

FRONT DUMP TOTAL REQUEST:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc ID no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00000111B tc data type
byte 5 to byte (n-2):
0000mmmmB msb part.
00001111B lsb part.
byte n-1: 0ccccccB checksum,
(add bytes 5 to (n-2), zero bit 7)
byte n: 11110111B exclusive end command

FRONT DUMP PARTIAL REQUEST:

byte 1: 11110000B exclusive dump start
byte 2: 00110011B tc ID no.
byte 3: 0xxxxxxxB tc device no.
byte 4: 00001000B tc data type
byte 5: 00000001B
byte 6: 11110111B exclusive end command.

SPECIAL NO. DUMP REQUEST:

byte 1:	11110000B	exclusive dump start
byte 2:	00110011B	tc ID no.
byte 3:	0xxxxxxxB	tc device no.
byte 4:	00001001B	tc data type
byte 5:	00000001B	
byte 6:	111101111B	exclusive end command.

KEYCODE OUT FROM TC2290 ENABLE/DISABLE:

byte 1:	11110000B	exclusive dump start
byte 2:	00110011B	tc ID no.
byte 3:	0xxxxxxxB	tc device no.
byte 4:	00001010B	tc data type
byte 5:	0000000eB	e=1 (enable keycode o/p)
byte 6:	11110111B	exclusive end command

3. KEYCODE LIST:

In addition to the list in chapter 9.5, TC2290 owners manual:

```
EXCBEG  =   252      ; MIDI exclusive key code begin
EXCEND  =   253      ; MIDI exclusive key code end
HOLDKY  =   254      ; Hold key code ( 20 mSec interval)
OFFKEY  =   255      ; No key code ( 20 mSec interval)
```

4. PRESET PARAMETER LIST:

(from source file AR28.def)
unless otherwise noted, each parameter takes up 1 BYTE

DLYTIM = Delay time, format = multiple 1 mSec up to 32767 mSec.
If bit 15 = 1 then multiple 0.1 mSec (up to 999.9 mSec)
2 bytes

FBKGA = Feedback gain. Range : 0 to 99

HFCUT = High cut feedback frequency. Range 0 to 3
0 = Flat (>20KHz) 1 = 8 KHz
2 = 4 KHz 3 = 2 KHz

LOCUT = Low cut feedback frequency. Range 0 to 3
0 = Flat (20Hz) 1 = 100 Hz
2 = 200 Hz 3 = 400 Hz

FBKDS = Feedback section display select. Selects what is shown on display and can be changed with the up/down keys.
0 = FB, feedback gain
1 = HIGH cut frequency (KHz)
2 = LOW cut frequency (KHz)

DLYGA = Delay signal gain into pan circuit. Range : 0 to 99
DIRGA = Direct signal gain into pan circuit. Range : 0 to 99
VOLGA = Volume (output) gain. Range : 0 to 99
POSIT = Base position for the audio signal to be panned.
Range : 0 to 99

OUTDS = Output section display select. Selects what is shown on the display and is sensitive to up/down keys.
0 = Delay output gain
1 = Direct output gain
2 = Output volume gain
3 = Pan base position. (check)

PANCS = Pan configuration select
0 = Delay in reverse phase
1 = Pan delay signal only
2 = Pan direct signal
3 = Pan alternate side

DLYSP = DLY MOD SPEED (0.10 to 10), 2 bytes
PANSP = PAN MOD SPEED (0.10 to 10), 2 bytes
DYNSP = DYN MOD SPEED (0.10 to 10), 2 bytes

DLYDP = DLY MOD DEPTH (0 to 99)
PANDP = PAN MOD DEPTH (0 to 99)
DYNDP = DYN MOD DEPTH (0 to 99)

DLYTH = Delay mod. threshold (1 to 9) = SPEC.NO. 10
PANTH = Pan mod. threshold (1 to 9) = SPEC.NO. 11
DYNTH = Dynamic mod. threshold (1 to 9) = SPEC.NO. 12
FBKTH = Feedback mod. threshold (1 to 9) = SPEC.NO. 13

DLYMM = Delay modulation mode (Ctrl. by WAVEFORM KEY).
0 = SIN 1 = RND 2 = ENV 3 = TRIG
PANMM = Pan modulation mode (Ctrl. by WAVEFORM KEY).
0 = SIN 1 = RND 2 = ENV 3 = TRIG
DYNMM = Dyn modulation mode (Ctrl. by WAVEFORM KEY).
0 = SIN 1 = RND 2 = ENV 3 = TRIG

MODDS = Modulation section display select. Selects which of the 6 parameter settings are shown in the modulation section display and direct key entry.
Bit 7 : 0 = Speed (comma active), 1 = depth
Low bits : 0 = Delay modulation oscillator
Low bits : 1 = Pan modulation oscillator
Low bits : 2 = Dynamic oscillator

DLYMF = Delay modulation flag. Active if > 0
PANMF = Pan modulation flag. Active if > 0
DYNMO = Dynamic modulation flag. Active if > 0

OPIVF = Output invert flag. Active if > 0
FIBVF = Feedback invert flag. Active if > 0
DLYON = Delay on. When = 0, then input is muted, modulation is off and front LED is off. When > 0, then delay output is active, modulation is active and the LED is lit.
DYRFL = Dynamic reverse flag. Active if > 0
SAMFL = Sample flag and mode. Active if > 0
DLRFL = Delay modulation reverse = SPEC.NO. 9
BPMTH = Bypass method = SPEC.NO. 26
0 = Input mute
1 = Output mute
2 = Input and output mute
EXTEF = External effect control
Bit 0 = 1 : Extern effect 1 active
Bit 1 = 1 : " " 2 "
etc...
Bit 4 = 1 : Extern effect 5 active
Bit 7 = 1 : Toggle all effects

The following 4 sample front/rear points are well scaled in mS. Absolute max. value = 32767 or SAMMAX. If SAMSEC > 0 or if > 9999 mS then display will show in seconds (with point).
If SEPRPP = 0 then PBFRNT and RCFRNT are edited in parallel, similarly w. PBREAR or RCREAR.

PBFRNT = Playback front point, 2 bytes
RCFRNT = Record front point, 2 bytes
PBREAR = Playback rear point, 2 bytes
RCREAR = Record rear point, 2 bytes

FRNTON = Front on select. If > 0, then front point is shown on display and can be edited. If = 0 then rear point.

MTBEAT = Metronome beat = SPEC.NO. 28
If > 0, then automatic sample playback repeat.
Trigger source e.g. <LEARN> starts/stops metronome.
If MTBEAT in interval 60000 down to 256 then value is time interval in mS, otherwise MTBEAT is in beats per minute. 2 bytes.

PPITCH = Playback pitch = SPEC.NO. 35. Range 0 to 24 or 500 to 2000.
0 to 24 choses 25 semitones (chromatic) in total 2 octaves. 12 is normal or no pitch shift i.e. 1024 bits/sec.
500 to 2000 is for pitch shift ratios 0.5 to 2.0, (with RPITCH (recording pitch) set to 1000 (1.0)
12 and 1000 thus give equal results. 2 bytes

NXTPRE = Next preset = SPEC.NO. 33. If > 0, then this preset is automatically recalled when sample rear point is reached at sample playback.

SEQCNT = Sequency counter. = SPEC.NO. 27
For sample trig sample sequencing.
0 No sequencing function
1 to 100 Repeat times at playback w. normal trig.
101 to 200 Number of selftriggered playbacks (minus 100) when recalling this preset.

CFTIME = Cross fade time. = SPEC.NO. 34
format = multiple 1 mSec up to 32767 mSec.
If above 9999 mSec, then shown on display in sec. with point. 2 bytes.

5. SPECIAL NO. PARAMETER DESCRIPTION:

Unless otherwise noted each parameter takes up one byte. User oriented descriptions may be found in OWNERS MANUAL chapter 9.4 and the papers included with the SA02 software.

RPITCH = SPEC.NO. 36 (RECORDING PITCH), works similar to SPEC.NO. 35, changing recording speed. RPITCH: 2 bytes
PSAVE = SPEC.NO. 37 (RESET), 2 bytes
PROPR = SPEC.NO. 8 Protect presets above this number
LOCKON = SPEC.NO. 19 Lock on keyboard if > 0
MIDIEN = SPEC.NO. 6 MIDI enable
MIDICH = SPEC.NO. 4 MIDI basic channel
MIDIOM = SPEC.NO. 5 MIDI omni
SRMINS = SPEC.NO. 7 Number of seconds RAM installed
SRMMAX = ***RESERVED*** for calculated max. memory available in mS:
SRMMAX = (SRMINS*1024)-1. Do not change.
2 bytes
DLYMAX = SPEC.NO. 38 Memory reserved for delay. Must be <=SRMMAX, and, to avoid overlap between SAMPLE and DELAY memory : (DLYMAX + SAMMAX + 1) must be < SRMMAX. 2 bytes
SAMMAX = SPEC.NO. 39 Memory reserved for sampling. SAMMAX must be at least 3 mS smaller than SRMMAX, to leave room for 'parking' the record/play heads. To avoid overlap between SAMPLE and DELAY memory : (DLYMAX + SAMMAX + 1) must be < SRMMAX. 2 bytes
SRXEND = ***RESERVED*** for highest sound RAM address given by SRMINS. Do not change. Scaled in 0.5 mS steps.
2 bytes
SAXEND = ***RESERVED*** for highest sound RAM address usable for sampling. Do not change. Scaled in 0.5 mSec steps. 2 bytes
SAXERA = ***RESERVED*** for sound RAM erase at pwr on. At pwr on it is set = SAMMAX. First entry to arm playback initiates a muted input recording from this address down to 0. Do not change. 2 bytes
PLYTH = SPEC.NO. 31 Playback trig. threshold at envelope input. Format is ROM 1 to 9 (in 3 dB steps).
RECTH = SPEC.No. 30 Record trig. threshold at envelope input. Format is from 1 to 9 (in 3 dB steps)
STHYS = SPEC.NO. 29 Sample envelope input trig. hysterese. Format is from 1 to 20 (dB)
STXHYS = ***RESERVED*** for exponential recalculation of STHYS, resulting in a 25 to 255 range. Do not change.
SPNROL = SPEC.NO. 20 If > 0 then special parameter roll function = TRUE.
LUSRER = SPEC.NO. 23 Last user error code

USRERR = ***RESERVED*** for user error code
LFATER = SPEC.NO. 24 Last fatal error code
FATERR = ***RESERVED*** for fatal error code
FERRPS = ***RESERVED*** for fatal error P save. Call address at JSR
FERROR saved. Do not change. 2 bytes
PRENO = The currently on front and executed preset number. Range
0 to 99. - Is not a special number, but is
needed at next power on.
SPNSYS = SPEC.NO. 21 Special number system access.

Next 5 bytes disables parameter update at preset recall if > 0

PEXFDS = SPEC.NO. 18 ext. effect ctrl
PVGADS = SPEC.NO. 16 output volume
PDGADS = SPEC.NO. 17 direct output gain
PDONDS = SPEC.NO. 14 "delay on" (DYLON)
PSAMDS = SPEC.NO. 15 "sample"

TCEXID = SPEC.NO. 1 TC MIDI ID code (fac.def. = 51)
EXIPDS = SPEC.NO. 2 MIDI excl. code input disable if > 0
EXOPDS = SPEC.NO. 3 MIDI excl. code output disable if > 0
DIBPGA = SPEC.NO. 25 Direct signal bypass volume, range 0 to 99
AKASTG = SPEC.NO. 40-48
AKBSTG = SPEC.NO. 50-58
AKCSTG = SPEC.NO. 60-68
AKDSTG = SPEC.NO. 70-78
AKESTG = SPEC.NO. 80-88
AKFSTG = SPEC.NO. 90-98
WAITM2: ***RESERVED*** for 'wait for nextadr mode 2 around HW5000'. In
10 mSec increments. Do not change. 2 bytes

Next four bytes are front parameters saved for use at next power on if SPEC.NO. 14, 16, 17 or 18 > 0. "preset update disable".

WDLYON: 1 byte
WVOLGA: 1 byte
WDIRGA: 1 byte
WEXTEF: 1 byte
LASTPN: Last preset number for use at next power on
TCEXDV: SPEC.NO. 110. tc excl. device no.

6. SPECIAL NO. LIST:

```
;              |---------------------------- min value
;              |     |---------------------- max value
;              |     |     |---------------- factory default
;              |     |     |       |-- in presets
;              |     |     |       |
; 0 = VERSNO   read only      28.90     No
; 1 = TCEXID   0      127     51        NO
; 2 = EXIPDS   0      1       1         No
; 3 = EXOPDS   0      1       1         No
; 4 = MIDICH   1      16      1         No
; 5 = MIDIOM   0      1       0         No
; 6 = MIDIEN   0      1       0         No
```

```
;  7 = SRMINS    2       32      4         No
;  8 = PROPR     1       100     80        No
;  9 = DLRFL     0       1       0         Yes
; 10 = DLYTH     1       9       5         Yes
; 11 = PANTH     1       9       5         Yes
; 12 = DYNTH     1       9       5         Yes
; 13 = FBKTH     1       9       5         Yes
; 14 = PDONDS    0       1       0         No
; 15 = PSAMDS    0       1       0         No
; 16 = PVGADS    0       1       0         No
; 17 = PDGADS    0       1       0         No
; 18 = PEXFDS    0       1       0         No
; 19 = LOCKON    0       1       0         No
; 20 = SPNROL    0       1       0         No
; 21 = SPNSYS    0       255     0         No
; 22 = LASTKE    0       0       0         No
; 23 = LUSRER    0       0       0         No
; 24 = LFATER    0       0       0         No
; 25 = DIBPGA    0       99      99        No
; 26 = BPMTH     0       2       2         Yes
; 27 = SEQCNT    0       200     0         Yes
; 28 = MTBEAT    0       60.00   0         Yes
; 29 = STHYS     1       20      6         No
; 30 = RECTH     1       9       2         No
, 31 = PLYTH     1       9       5         No
; 32 = SEPRPP    0       2       0         No
; 33 = NXTPRE    0       99      0         Yes
; 34 = CFTIME    20      33.00   50        Yes
; 35 = PPITCH    0       2000    12        Yes
; 36 = RPITCH    0       2000    12        No  - Not acessible
; 37 = PSAVE     0       9999    2290      No
; 38 = DLYMAX    0 (5)   (2)     1023      No
; 39 = SAMMAX    0 (5)   (3)     2815      No
; 40 to 48
;    = AKASTG    0       199     199       No
; 50 to 58
;    = AKBSTG    0       199     199       No
; 60 to 68
;    = AKCSTG    0       199     199       No
; 70 to 78
;    = AKDSTG    0       199     199       No
; 80 to 88
;    = AKESTG    0       199     199       No
; 90 to 98
;    = AKFSTG    0       199     199       No
;101 = DMOADJ    0       1       0         No
;
; DD28V90 additions
;110 = TCEXDV    0       127     0         No
;111 = PRESRC    0       100     0         No
;112 = PREDES    0       100     0         No
;113 = PRETOT    0       99      0         No
;114 = TOTDMP    0       1       0         No
;115 = SNOREQ    0       1       0         No
;116 = EXKCEN    0       1       1         No
```

8.1.9. PRESET/PARAMETER DUMPS BETWEEN TC2290's

OWNERS MANUAL chapter 8.1 additions using PROM version DD28V9X.

GENERAL REQUEST/DUMP SETUP:

Connect MIDI IN slave to MIDI OUT master
Connect MIDI OUT slave to MIDI IN master
Then on both machines;
Set MIDI ENABLE on

Now the two machines should be 'linked', so that any keystroke on one is duplicated on the other. Before dumping anything, however, we suggest that you turn off this 'crosstalk' while dumping from one to the other.
To turn off the keycode generation from the TC2290's:

Set EXCL.KEYCODE GEN. off: <SPEC> <1x1x6> <ENTER> <0> <ENTER>

- This should do to get started.

The other parameters necessary for MIDI exclusive dumps are:

Check MIDI EXCL.INPUT on: <SPEC> <2> <ENTER> <0> <ENTER>
Check MIDI EXCL:OUTPUT on: <SPEC> <3> <ENTER> <0> <ENTER>

Check MIDI EXCL.DEVICE # (SPEC#110) is equal on the two machines.
Can be used to direct the exclusive dumps to specific TC2290's
Check MIDI TC EXCL.ID# (SPEC#1) is '51'on both machines - Although you can change this ID#, we suggest that you do not do so as, at next power on, it will be reset to '51'.

Note: When 'talking exclusive' as we are here, the MIDI CHANNEL NO & MIDI OMNI parameters are ignored!

REQUEST A SINGLE PRESET FROM ANOTHER TC2290:

On the receiver, write to 'PRESET REQUEST' = SPEC#111 the preset number you want:

<SPEC> <1><1><1> <ENTER> <remote preset no.> <ENTER>

This will 'recall' the preset from the other TC2290 and store it in the corresponding local preset number.

Or if you want another local position, you can use 'PRESET DESTINATION' = SPEC#112 to decide where the preset should be stored locally:

<SPEC> <1><1><2> <ENTER> <local preset no.> <ENTER>

The requested preset will then be stored in this local preset #.

With 'PRESET DESTINATION' set to '100', the remote preset is transferred to the frontsettings of the local TC2920. With this setting you can think of SPEC#111 as being a 'RECALL REMOTE PRESET #' command.

After the preset has been received, SPEC#111 is automatically set to '0' to show 'transfer complete'.
If you request preset # 100, you get the frontsettings of the other TC2290. If the transfer is not possible then set SPEC#111 to '0' (or power off/on) and check 'General Request/Dump Setup'.

Note: The PRESET PROTECT parameter (SPEC # 8) is ignored!

REQUEST ALL PRESETS BELOW 50 FROM ANOTHER TC2290:

On the local (receiving) TC2290 write to 'PRESET TOTAL REQUEST':

<SPEC> <1><1><3> <ENTER> <5><0> <ENTER>

The 50 presets will now be sent from the other TC2290 and stored in the same preset positions on the local TC2290.
While receiving the presets you will see the PRESET DISPLAY count down. Of course, any other number of presets can be requested.

Note: The PRESET PROTECT parameter (SPEC # 8) is ignored!

If the transfer is not possible, then set SPEC#113 to '0' (or power off/on) and check 'General Request/Dump Setup'.

REQUEST THE SPECIAL NUMBER SETTINGS FROM ANOTHER TC2290:

On the receiver, write to 'SPECIAL NO:REQUEST' = SPEC#111:

<SPEC> <1><1><5> <ENTER> <1> <ENTER>

The requested SPECIAL NUMBER SETTINGS will be returned to the receiver.

After the special numbers settings have been received, SPEC#115 is automatically set back to '0' (OFF).

Note:
All 'global' SPECIAL NUMBERS settings (those not individual to each preset) below SPEC#100 (+SPEC#110 (TC EXCL:DEVICE #) are transferred. So if the two TC2290 have different memory option sizes, the parameters for this must be changed back

manually.

If the transfer is not possible, then set SPEC#113 to '0' (or power off/on) and check 'General Request/Dump Setup:

TOTAL DUMP FROM A MASTER TC2290 TO A SLAVE TC2290:

On the TC2290 you chose as 'master' press:

<SPEC> <1><1><4> <ENTER> <1> <ENTER>

This will result in the transmission of all PRESETS, frontsettings and SPECIAL number settings to MIDI OUT of the chosen master.
Any connected 'slave' TC2290 (with 28.9x software) with its MIDI IN to this 'master' MIDI output will overwrite all its own settings, if the 'General Request/Dump Setup' above is made.

Check the notes under 'Request all presets....' and 'Request the special number settings...'

SPECIAL NUMBER ADDITIONS FOR PROM VERSION 28.90

110 through 116 : See above descriptions.

Spec#	min/max value	fac. default	preset/	Name/ Function
110	0–127	0	No	tc Exclusive Device #
111	0–100	0	No	Preset Request
112	0–100	0	No	Preset Destination
113	0–99	0	No	Preset Total Request
114	0–1	0	No	Total Dump Send
115	0–1	0	No	Special No. Request
116	0–1	1	No	Exclusive Keycode

Enable 0 = No
1 = Yes