CR78-PGM

Controller & Programmer for Roland CR-78 - CompuRhythm

Model 8-452   Version 3.0

LCD CONTR | MIDI IN | DIN-SYNC IN | EXT CLK | WRITE | START STOP | 8-15 V

SYNC

INT
MIDI
DIN

PGM MODE

WRITE INSTR | NEXT | BEAT

PLAY INSTR | START STOP | TEMPO

PLAY MODE

ROLAND CR-78
CONTROLLER &
PROGRAMMER

8-452
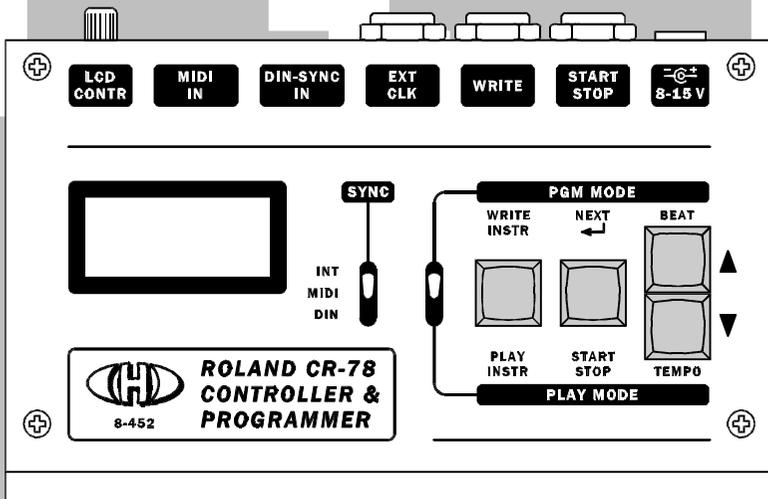
Owner's Manual

Contents   Page

1   CONTROLLER DESCRIPTION

CR78-PGM is programmer and controller for Roland CR-78 drum-machine. With help of it, CR-78 can be programmed very easy (by similar way as with original Roland WS-1 programmer). More over, CR78-PGM enables to control CR-78 during playback manually or via MIDI or DIN-SYNC buses.

Fig. 1 – Panels of the device

Rear panel

Top panel
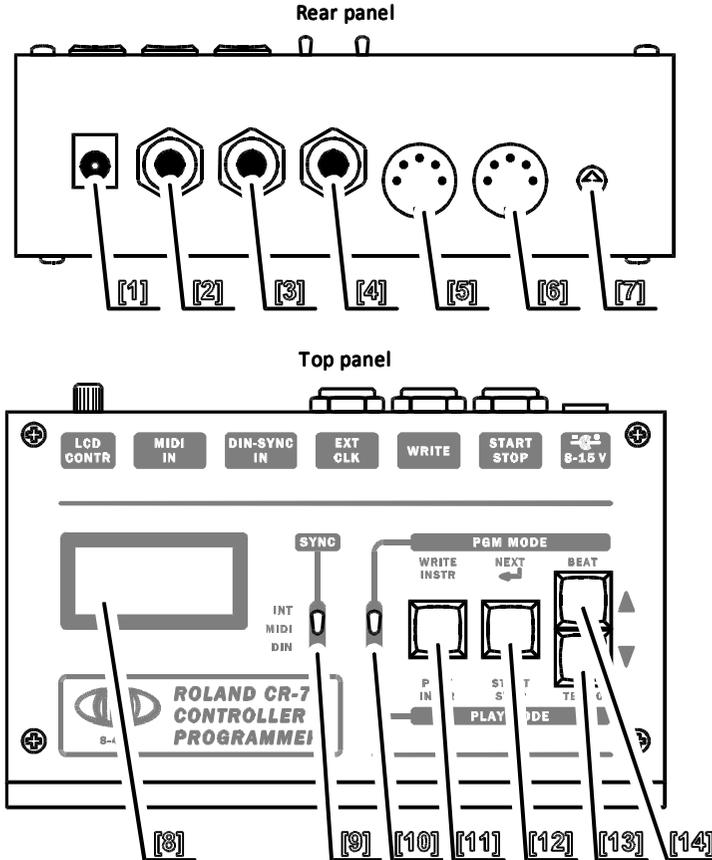
[1] Power supply connector DC
[2] START/STOP signal output
[3] WRITE signal output
[4] CLOCK signal output
[5] DIN-SYNC bus input
[6] MIDI bus input
[7] LCD contrast setting

[8] Display
[9] Synchronization selector – SYNC switch
[10] Working mode selector – MODE switch
[11] PLAY / WRITE INSTRUMENT button
[12] START-STOP / NEXT button
[13] DECREMENT button
[14] INCREMENT button

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2   CONTROLLER CONNECTION

Figure 2 shows complete connection of the controller into the system. Schematics of used cables are shown in figure 3.

If synchronization with MIDI and/or DIN-SYNC bus is not necessary, corresponding interconnecting cable(s) remain unused.

Fig. 2 – Connection of the device
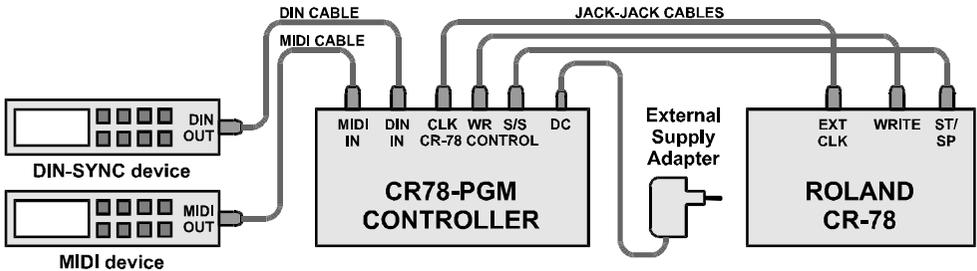
Fig. 3 – Cables for connection
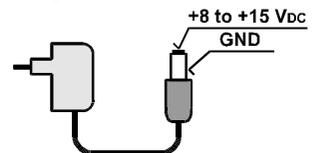
The device is powered from external supply adapter. DC voltage from the adapter is connected to DC power supply connector [1]. It is standard coaxial connector (diameter 5,5 / 2,1 mm) – so called barrel type. External power supply unit must be able to provide at least 200 mA at 8 - 15 volts. The DC voltage needn't to be stabilized. It means that most of universal PSU can be used. No special adapter is necessary.

Fig. 4 – Power supply adapter

The positive pole of supply voltage must be on inner pin, the negative on the external pin of the connector – see figure 4. The polarity is also depicted on panel of the device. The device has built-in reverse polarity protection. Incorrect polarity cause no damage, however the device will not work in such case.

Remark: *The power supply adapter is not included in the product delivery!*

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3   CONTROLLER OPERATION

The device is not equipped with power switch. It works immediately after a supply adapter is connected.

CHD CR78-PGM After connection with CR-78 instrument, it is necessary to turn on the controller first (to connect power supply adapter to the controller). Now reset sequence will begin. During reset, display ⟦8⟧ shows name of the device. After the reset sequence, CR-78 can be turned on yet (by "POWER" switch on the instrument's panel).

All information about actual status of the device are displayed on display ⟦8⟧ during operation. Contrast of the display viewing can be set with LCD-CONTR ⟦7⟧ knob on rear panel.

3.1   WORKING MODE SELECTION

Requested working mode of the device can be selected by MODE ⟦10⟧ switch – "PLAY" for playback (lower position) or "PGM" for programming of user memories of CR-78 (upper position of the switch lever).
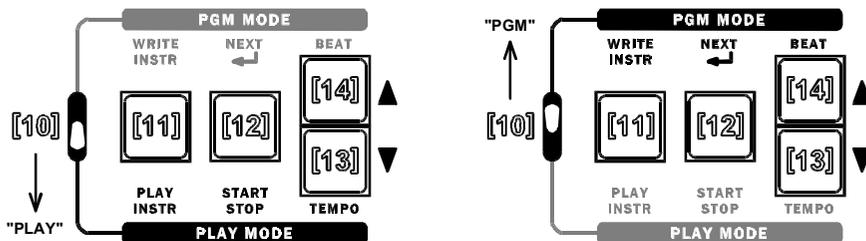
4   "PLAY" WORKING MODE

– PLAY –
– MODE –
After PLAY mode is selected by MODE ⟦10⟧ switch, display ⟦8⟧ shows info about working mode change shortly and then the controller comes into playback mode.

In PLAY mode, the device controls tempo of CR-78 instrument and its START/STOP function. Method of control depends on selected synchronization source selected by SYNC ⟦9⟧ switch.

Remark: *The "TEMPO" knob on CR-78's panel is not functional if a cable is plugged in the "EXT CLOCK" connector on rear panel of CR78.*

4.1   SELECTION OF SYNCHRONIZATION SOURCE

CR-78 synchronization source can be selected by three-position SYNC ⟦9⟧ switch. It is possible to select these sources: Manual control with help of controllers on device's panel (upper position of SYNC switch), synchronization with MIDI bus (middle position of SYNC switch) or synchronization with DIN-SYNC bus (lower position of SYNC switch).

4.1.1   MANUAL SYNCHRONIZATION

INT ●	INT ▶
♩=120	♩=120
INT ▶	INT ▶
♩=025	♩=500

In manual (internal) synchronization mode, "INT" and "START [▶]" / "STOP [●]" symbols are shown in upper row of display ⟦8⟧, actual tempo is shown in lower row.

Playback tempo is controlled with TEMPO INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons. Range of the tempo can be from 25 to 500 BPM (Beats per Minute).

Tempo is increased / decreased in ±1 steps if INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons are pressed shortly. If TEMPO INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons are pressed longer time, the tempo is increased / decreased continuously during the buttons are held.

Playback can be started and stopped with help of START / STOP ⟦12⟧ button. Actual status is shown on the right in upper row of display ⟦8⟧. Round symbol [●] represents STOP status; arrow symbol [▶] represents START status.
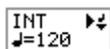
```
INT    ▶↕
♩=120
```
With help of PLAY INSTR ⟦11⟧ button, it is possible to run up a sound generator of CR-78 which is selected with "INSTRUMENT SELECTOR" rotary selector on CR-78 panel. After the PLAY INSTR ⟦11⟧ button is pressed, display ⟦8⟧ shows info about an instrument launching [↯] for a moment.

Remark: *A drum instrument can be running by this way only when CR-78 is just playing a rhythm. It is impossible when playback is stopped.*

4.1.2 SYNCHRONIZATION WITH MIDI CLOCK

```
MIDx1 ●   MIDx1 ▶
♩=120,0   ♩=120,0
```
In MIDI synchronization mode, the controller receives commands from MIDI-IN ⟦6⟧ input. Only common system commands CLOCK (F8h), START (FAh), CONTINUE (FBh) and STOP (FCh) are acceptable. All others MIDI commands are ignored – they are not recognized by the controller. "MID" and "START" / "STOP" symbols are shown in upper row of display ⟦8⟧. Round [●] represents STOP status, arrow [▶] represents START status.

```
MIDx1 ●   MIDx1 ●
♩=Slow    ♩=Fast
```
Actual tempo of playback derived from MIDI CLOCK commands is displayed in upper row of display ⟦8⟧ in BPM (Beats per Minute) form. Info "Slow" is displayed if the tempo is lower than 0,6 BPM or if no MIDI CLOCK commands are received. Info "Fast" is displayed if the tempo is higher than 999,9 BPM.

```
MIDx1 ●   MIDx2 ●
♩=120,0   ♩=120,0
```
With help of INCREMENT ⟦14⟧ and DECREMENT ⟦13⟧ buttons, normal [×1] or doubled [×2] speed of playback tempo can be chosen.
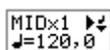
```
MIDx1 ▶↕
♩=120,0
```
With help of PLAY INSTR ⟦11⟧ button, it is possible to run up a sound generator of CR-78 which is selected with "INSTRUMENT SELECTOR" rotary selector on CR-78 panel. After the PLAY INSTR ⟦11⟧ button is pressed, display ⟦8⟧ shows info about an instrument launching [↯] for a moment.

Remark: *A drum instrument can be running by this way only when CR-78 is just playing a rhythm. It is impossible when playback is stopped.*

START/STOP ⟦12⟧ button is not used in MIDI synchronization mode at all.

4.1.3 SYNCHRONIZATION WITH DIN-SYNC CLOCK

```
DIN24 ●   DIN24 ▶
♩=120,0   ♩=120,0
```
In DIN-SYNC synchronization mode, the controller receives CLOCK and RUN signals from DIN ⟦5⟧ input. Signals RESET and FILL are ignored – they are not recognized by the controller. "DIN" and "START" / "STOP" symbols are shown in upper row of display ⟦8⟧. Round [●] represents STOP status, arrow [▶] represents START status.

```
DIN24 ●   DIN24 ●
♩=Slow    ♩=Fast
```
Actual tempo of playback derived from DIN-SYNC CLOCK signal is displayed in upper row of display ⟦8⟧ in BPM (Beats per Minute) form. Info "Slow" is displayed if the tempo is lower than 0,6 BPM or if no CLOCK signal is present. Info "Fast" is displayed if the tempo is higher than 999,9 BPM.
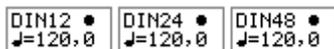
```
DIN12 ●   DIN24 ●   DIN48 ●
♩=120,0   ♩=120,0   ♩=120,0
```
TEMPO INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons select type of DIN-SYNC bus in accordance to number of clock pulses per quarter note (PPQN). DIN-24 (24 PPQN) type is default setting. This type complies with most of devices equipped with DIN-SYNC output. For the others, DIN-12 (12 PPQN) or DIN-48 (48 PPQN) types can be selected.

Remark: *Count of clock pulses transmitted from a connected device must be found in documentation of this device and type of DIN-SYNC bus must be set in accordance with it.*
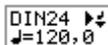
`DIN24 ▶⎮`
`♩=120.0`

With help of PLAY INSTR [[11]] button, it is possible to run up a sound generator of CR-78 which is selected with "INSTRUMENT SELECTOR" rotary selector on CR-78 panel. After the PLAY INSTR [[11]] button is pressed, display [[8]] shows info about an instrument launching [♩] for a moment.

Remark: *A drum instrument can be running by this way only when CR-78 is just playing a rhythm. It is impossible when playback is stopped.*

START/STOP [[12]] button is not used in DIN-SYNC synchronization mode at all.

5   "PGM" WORKING MODE

`- PGM -`
`- MODE -`

Programming (PGM) mode of the device enables very easy programming of CR-78's user memories (patterns). After PGM mode is selected (with MODE [[10]] switch), display [[8]] shows info about working mode change shortly and then the controller comes into programming mode.

`Prepare`
`CR-78 !`
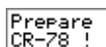
After entering into programming mode, invitation for setting of CR-78 is shown on display [[8]]. Valid setting of CR-78 must be confirmed by NEXT [[12]] button pressing. Now programming procedure begins.

`♩=⅛`
`1:01:00`
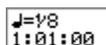
Length of programming step is displayed in upper row and actual position of programming is displayed in lower row of display [[8]]. Requested length of programming step (length of Beat) can be selected with BEAT INCREMENT [[14]] / DECREMENT [[13]] buttons. Just selected length of programming step is shown on display [[8]]. Available Beats and their lengths in clock pulses (ticks) are listed in table below:

Table 1 – Lengths of available Beats									
Beat	$1/32^3$	$1/16^3$	1/16	$1/8^3$	1/8	$1/4^3$	1/4	$1/2^3$	1/2	1/1
Length [Clock ticks]	1	2	3	4	6	8	12	16	24	48

Actual position is displayed in M:B:T (Measure : Beat : Tick) form. Starting position (after PGM mode is selected) is always 1:01:00.

`♩=⅛  ♩`
`1:01:00`
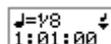
Pressing of WRITE INSTR [[11]] button inserts drum instrument selected with "INSTRUMENT SELECTOR" selector on CR-78 panel onto actual position. Actual position is not changed when an instrument is inserted so it is possible to insert more instruments (up to 4, ACCENT include) onto the same position. It can be done if next instrument is selected with "INSTRUMENT SELECTOR" selector on CR-78 panel and then WRITE INSTR [[3]] button is pressed repeatedly. Symbol of note [♩] is displayed in upper row of display [[8]] every time when the button is pressed. The controller doesn't react during the symbol is displayed – it is necessary to wait for blackout of the symbol before next pressing of a button.

`♩=⅛`
`1:01:00→`
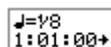
Actual position is shifted one step ahead if NEXT [[12]] button is pressed. Length of the step is equal to number of clock pulses (Ticks) corresponded to duration of selected Beat (with BEAT INCREMENT [[14]] / DECREMENT [[13]] buttons – see table 1). After the position is shifted, new actual position is shown in lower row of display [[8]]. Repeated pressing of NEXT [[12]] button enables sequent stepping – it is equivalent to insertion of a pause. Symbol of arrow [→] is displayed in lower row of display [[8]] every time when the button is pressed. The controller doesn't react during the symbol is displayed – it is necessary to wait for blackout of the symbol before next pressing of a next button.

5.1 PROGRAMMING MODE ON CR-78

It is necessary to turn CR-78 to programming mode before start of CR-78's memories programming. Some controllers on CR-78's panel must be set to following positions:

- Requested memory must be selected with "PROGRAM RHYTHM" selector. The memory can be erased before programming if necessary.

- "PROGRAM SWITCH" must be in "MEMORY" position.

- Requested (programmed) drum instrument must be selected with "INSTRUMENT SELECTOR" rotary selector.

Note that all four user memories of CR-78 have fix length of two four-quarter measures. It is 96 clock pulses (Ticks) – CR-78 uses 12 PPQN (Pulses per Quarter Note) resolution. When length of memory is exceeded during programming procedure, clock pulses counting starts from 1:01:00 position repeatedly. This corresponds to method of position indication on display ⟦8⟧.

5.2 SEQUENCE OF "STEP BY STEP" PROGRAMMING

Example: Store rhythm on figure 5 into user memory of CR-78.

Fig. 5 – Example of simple rhythm

Sequence:

1) Set the controller to programming mode (MODE ⟦10⟧ switch to "PGM" position) and wait for display of "Prepare CR-78 !" invitation.

2) Select requested memory of CR-78 ("PROGRAM RHYTHM" selector onCR-78 panel).

3) Erase selected memory of CR-78: set "PROGRAM SWITCH" switch (on CR-78 panel) to "ALL" position and press "CLEAR" button (on CR-78 panel).

4) Set "PROGRAM SWITCH" switch (on CR-78 panel) to "MEMORY" position.

5) Confirm valid setting of CR-78 by NEXT ⟦12⟧ button pressing.

6) Now the programming procedure begins. First note of programmed rhythm is a quarter note – set length of Beat to "1/4" (with BEAT INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons). Display shows 1:01:00 position (it is first quarter of first measure).

7) Select "BD" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR ⟦11⟧ button pressing (on the controller).

8) Select "CY" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR ⟦11⟧ button pressing (on the controller).

9) Press NEXT ⟦12⟧ button (on the controller) for continuing to next note. Display ⟦8⟧ will show 1:02:00 position (second quarter of first measure).

10) Select "CH" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR ⟦11⟧ button pressing (on the controller).

11) Press NEXT ⟦12⟧ button (on the controller) for continuing to next note. Display ⟦8⟧ will show 1:03:00 position (third quarter of first measure).

12) Store "CH" instrument (it stays selected from previous step) with WRITE INSTR ⟦11⟧ button pressing (on the controller).

13) Select "SD" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

14) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 1:04:00 position (fourth quarter of first measure).

15) Next notes are 8th - set length of Beat to "1/8" (with BEAT INCREMENT [14] / DECREMENT [13] buttons). Display [8] will show 1:07:00 position (seventh 8th of first measure).

16) Select "CH" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

17) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 1:08:00 position (eighth 8th of first measure).

18) Select "BD" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

19) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 2:01:00 position (first 8th of second measure).

20) Next notes are quarters again - set length of Beat to "1/4" (with BEAT INCREMENT [14] / DECREMENT [13] buttons). Display [8] will show 2:01:00 position (first quarter of second measure).

21) Store "BD" instrument (it stays selected from previous step) with WRITE INSTR [11] button pressing (on the controller).

22) Select "CH" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

23) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 2:02:00 position (second quarter of second measure).

24) Store "CH" instrument (it stays selected from previous step) with WRITE INSTR [11] button pressing (on the controller).

25) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 2:03:00 position (third quarter of second measure).

26) Store "CH" instrument (it stays selected from previous step) with WRITE INSTR [11] button pressing (on the controller).

27) Select "SD" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

28) Press NEXT [12] button (on the controller) for continuing to next note. Display [8] will show 2:04:00 position (fourth quarter of second measure).

29) Select "CH" with "INSTRUMENT SELECTOR" (on CR-78 panel) and store the instrument into CR-78's memory with WRITE INSTR [11] button pressing (on the controller).

30) Now programming of CR-78 memory is finished. Turn "PROGRAM SWITCH" switch on CR-78 panel to "PLAY" position.

31) Turn the controller to playback mode (MODE [10] switch to "PLAY" position).

32) CR-78 will replay newly programmed rhythm during next start of playback.

Any other rhythm can be programmed by similar way. The only limitation is, the shortest beat is 32th triplet and 32th note isn't accessible. This limitation is given by CR-78 construction.

In some cases, this limitation can be get out by doubling of tempo during playback. It is enabled if synchronization is INT or DIN-24 or DIN-48. But length of user memory is contracted to only one measure in that case.

Example: Store rhythm on pic. 6 into user memory of CR-78.

Fig. 6 – Example of more difficult rhythm

Sequence:

First, rewrite the rhythm for double-speed playback:

This rhythm can be programmed to CR-78 memory by method described above.

Set double tempo after the controller is turned back to playback mode:

- For internal synchronization (INT), set double tempo with BEAT INCREMENT ⟦14⟧ / DECREMENT ⟦13⟧ buttons directly.

- For DIN-SYNC synchronization (DINxx), set half resolution of clock pulses than it is really transmitted from clock source (set DIN-12 for synchronization source with PPQN = 24, set DIN-24 for source with PPQN = 48).

5.3   SEQUENCE OF PROGRAMMING IN REAL TIME

The controller enables real time programming of CR-78's rhythms too. This programming method is described in owner's manual of CR-78 (in THE OPERATION OF THE PROGRAMMER SECTION chapter). The only difference is that manual switch TS-1 described in the user manual is not used – it is replaced by WRITE INSTR ⟦11⟧ button on CR78-PGM controller.

The controller stays in playback working mode (PLAY). After setting of CR-78 (see above), tempo generator is turned on with help of START / STOP ⟦12⟧ button of the controller (if internal synchronization is selected) or from MIDI or DIN-SYNC device (if MIDI or DIN synchronization is selected). Now instrument selected with "INSTRUMENT SELECTOR" on CR-78's panel is written into CR-78's memory every time PLAY INSTR ⟦11⟧ button on CR78-PGM controller is pressed.

6   SPECIAL WORKING MODES

In addition to the standard operating modes, the device allows some other functions described below.

6.1   FIRMWARE VERSION DISPLAYING

If you need to know what version of firmware is installed in your CR78-PGM, execute this sequence:

- Press the INCREMENT ⟦14⟧ button and hold it.

- Only then switch the device on (connect power supply adapter to the device).

- Display ⟦8⟧ will show the number and date of installed firmware:

```
v. 3.00
10/2020
```
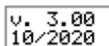
Now, the INCREMENT ⟦14⟧ button can be released.

- After about 3 seconds, the device comes to normal working mode automatically.

6.2   DEVICE ADJUSTMENT

The device enables user adjustment of length of pulses generated on START/STOP [2], WRITE [3] and EXT CLK [4] outputs. Sometimes this can be necessary – if the CR-78 instrument doesn't react correctly to Start / Stop and Write commands or when programming steps in PGM mode or running in PLAY mode are irregular.

This is mostly caused by input circuits of the CR-78. The instrument is very old and some components alter their parameters over time – especially electrolytic capacitors. In that case, longer START/STOP, WRITE and / or EXT CLK pulses have to be used for such instrument.

To entry into programming mode, press WRITE INSTR [11] button and hold it. Only then switch the device on (connect power supply adapter to the device). Display [8] shows first parameter value. Now, the WRITE INSTR [11] button can be released.

Remark: *Adjustment of the pulse lengths is available only in versions of operating system 3.00 and higher. So please check version of your firmware (see chapter 6.1) before you will try to change lengths of the pulses.*

6.2.1 SETTING OF START / STOP PULSE LENGTH

Display shows actual length of START / STOP pulse generated by the controller. New length can be adjusted by INCREMENT [14] / DECREMENT [13] buttons. Available values are from 30 to 130 ms:
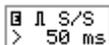
```
B Λ S/S
>   50 ms
```

For continue to next parameter, NEXT [12] button must be pressed.

6.2.2 SETTING OF WRITE PULSE LENGTH

Display shows actual length of WRITE pulse generated by the controller. New length can be adjusted by INCREMENT [14] / DECREMENT [13] buttons. Available values are from 10 to 50 ms:
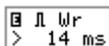
```
B Λ Wr
>   14 ms
```

For continue to next parameter, NEXT [12] button must be pressed.

6.2.3 SETTING OF CLOCK PULSE LENGTH

Display shows actual length of CLOCK pulse generated by the controller. New length can be adjusted by INCREMENT [14] / DECREMENT [13] buttons. Available values are from 2 to 12 ms:
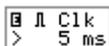
```
B Λ Clk
>    5 ms
```

For continue to next parameter, NEXT [12] button must be pressed.

6.2.4 SETTING OF PROGRAMMING CYCLE LENGTH

Display shows actual length of programming cycle executed in programming mode of the controller. New length can be adjusted by INCREMENT [14] / DECREMENT [13] buttons. Available values are from 4 to 24 ms:
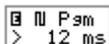
```
B Π Pgm
>   12 ms
```

This is the last parameter. The device comes to normal working mode after NEXT [12] button is pressed.

6.3   INTERNAL MEMORY INITIALIZATION

The device enables to set all parameters in its internal memory to default values – i.e. to factory setting. To launch the factory setting process, execute this sequence:

- Press the DECREMENT [[13]] button and hold it.

- Only then switch the device on (connect power supply adapter to the device).

- Display [[8]] will show message:

```
Init Mem
 Wait !
```

   Now, the DECREMENT [[13]] button can be released.

- During a few seconds, the memory is initialized and the device comes to normal working mode automatically.

6.4   ERROR STATUS INDICATION

If any error occurs during access to the device's internal memory (see chapters 6.2 and 6.3), the device stops all activities and an error message (with the error type) is shown on display [[8]]:

```
STOPPED!
Err 2
```
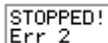
In that case, you have to switch the device off and then on again after a moment. If the error persists, the device must be repaired in specialized workshop.

6.5   HARDWARE TESTS

Operating system of the device contains routines for checking of functionality of own hardware circuits. The tests can be processed if the device does not work properly in harness with CR-78 instrument.
To entry into testing mode, press NEXT [[12]] button and hold it. Only then switch the device on (connect power supply adapter to the device). All dots are displayed on device's display [[8]] then. Now, the NEXT [[12]] button can be released.

6.5.1 TEST OF DISPLAY

Test of display [[8]] is launched automatically immediately after entering into testing mode. All dots or blank area are displayed alternately on all positions of the display (all dots luminous or all dots hidden):

Also functionality of LCD contrast regulator (LCD-CONTR [[7]]) can be tested during this test.

Continue to next test occurs automatically after any of buttons on device's panel is pressed.

6.5.2 TEST OF BUTTONS

Status of each of buttons is displayed as circular symbol on the display. This symbol is blank before a button is pressed and it will be filled after a button pressing.

```
W N I D        W N I D
o o o o        ● ● ● ●
```
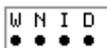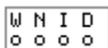
W = WRITE / PLAY INSTRUMENT [[11]]
N = NEXT / START – STOP [[12]]
I = BEAT / TEMPO INCREMENT [[14]]
D = BEAT / TEMPO DECREMENT [[13]]

Continue to next test occurs automatically after all four buttons are pressed.

6.5.3 TEST OF SWITCHES

Status of SYNC ⟦9⟧ and MODE ⟦10⟧ switches is displayed during this test. Actual position of some of switches is shown on display ⟦8⟧ under abbreviation of corresponding switch:

```
Syn  Mod    Syn  Mod    Syn  Mod
INT  ███    MID  ███    DIN  ███

Syn  Mod    Syn  Mod
███  PGM    ███  PLY
```
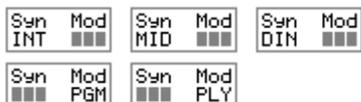
For continue to next test, NEXT ⟦12⟧ button must be pressed.

6.5.4 TEST OF DIN-IN INPUT

Display ⟦8⟧ shows actual status of DIN-SYNC bus signals on DIN-IN ⟦5⟧ input. Symbol "C" is used for Clock signal and symbol "R" is used for Run signal (signals Reset and Fill are not used in the controller):

```
DIN-Sync    DIN-Sync
C=0  R=0    C=1  R=1
```

Signals can be incoming to DIN-IN input from any DIN-SYNC transmitter or external source of DC voltage (from 4 to 5 volts) can be used – see picture:
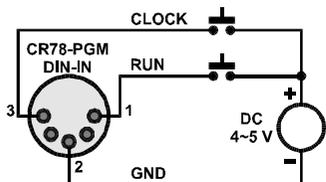
For continue to next test, NEXT ⟦12⟧ button must be pressed.

6.5.5 TEST OF MIDI-IN INPUT

Display ⟦8⟧ shows actual status of Transport MIDI commands received from MIDI transmitter on MIDI-IN ⟦6⟧ input:

```
MIDI-In
---  ---
```
Default status (no received MIDI command) is displayed as dashes.

```
MIDI-In
CLK  ███
```
Symbol "CLK" is shown on left side of the display ⟦8⟧ every time when Clock MIDI command (status byte F8h) is received on MIDI input. The symbol is shown for approx. 0,2 sec.

```
MIDI-In     MIDI-In     MIDI-In
███  STR    ███  CON    ███  STP
```
On right side of the display ⟦8⟧, symbol of last received Transport MIDI command is shown. The symbol is "STR" for START command (status byte FAh) or "CON" for CONTINUE command (status byte FBh) or "STP" for STOP command (status byte FCh).

For continue to next test, NEXT ⟦12⟧ button must be pressed.

6.5.6 TEST OF EXT-CLK OUTPUT

Status of the output can be set with INCREMENT ⟦14⟧ and DECREMENT ⟦13⟧ buttons. Actual status is shown on the display ⟦8⟧ simultaneously. +5V voltage level is on EXT-CLOCK ⟦4⟧ output in "ON" status and 0V voltage level is on the output in "OFF" status:

```
CLK-Out    CLK-Out
OFF        ON
```

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Status of the output can be checked with DC voltmeter or with help of testing circuit – see picture:
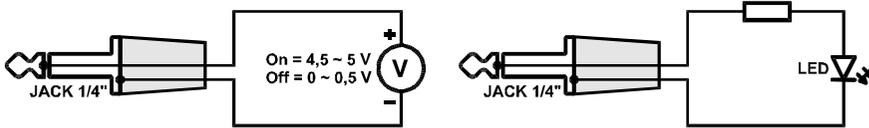
For continue to next test, NEXT [12] button must be pressed.

6.5.7 TEST OF WRITE OUTPUT

Status of the output can be set with INCREMENT [14] and DECREMENT [13] buttons. Actual status is shown on the display simultaneously. Contacts of WRITE [3] output are opened in ON status and the contacts are connected in OFF status - the output works as NC type switch:

```
WR-Out
OFF
```
```
WR-Out
ON
```

Status of the output can be checked with short-circuit tester or with help of testing circuit – see picture:
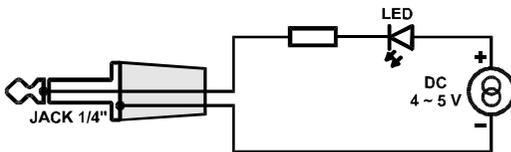
For continue to next test, NEXT [12] button must be pressed.

6.5.8 TEST OF START / STOP OUTPUT

Status of the output can be set with INCREMENT [14] and DECREMENT [13] buttons. Actual status is shown on the display simultaneously. Contacts of START / STOP [2] output are opened in ON status and the contacts are connected in OFF status - the output works as NC type switch:

```
S/S-Out
OFF
```
```
S/S-Out
ON
```

Status of the output can be checked with short-circuit tester or with help of testing circuit – see picture:
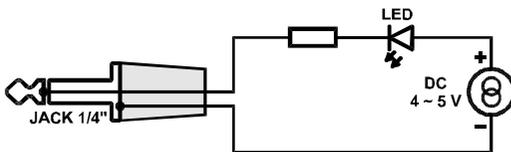
For continue, NEXT [12] button must be pressed.

6.5.9 TEST OF MEMORY

The test checks cells of the internal device's memory. During the test is in progress, display [8] shows message:

```
Memory
   Wait!
```
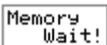
If none malfunction of the memory is found, confirmation message is shown on display [8] and continue to next step occurs automatically:

```
Memory
Cells OK
```
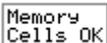
If a failed cell is detected, Display shows info about the error type and position of the failed cell. In this case, NEXT [12] button must be pressed for continue to next step:

```
Memo Err
2 / 108
```

6.5.10 END OF TESTS

All available tests are executed now. Display shows info:

```
End of
tests  ↵
```

For continue, NEXT [12] button must be pressed. Then the device comes to normal working mode.

If no error occurs during testing procedures, the device is fully functional and it should to work with CR-78 drum machine correctly. If the device doesn't work with CR-78 in this case, some mistake can be in used interconnecting cables or in CR-78 drum machine.

If any hardware error occurs during testing procedures, the device must be repaired in specialized workshop.

7   TECHNICAL SPECIFICATION

Power source :   external power supply adapter
     Supply voltage :   8 V_{DC} to 15 V_{DC}
     Current consumption :   200 mA max

EXT-CLOCK output :   Jack ¼" socket (TS)
     Signal :   push-pull mode
     Output voltage :   0 V for low level / +5V for high level
     Output impedance :   47 Ω

WRITE and START/STOP outputs :   Jack ¼" socket (TS)
     Signal :   NC switch mode
     Switched voltage :   up to +15 V
     Output impedance :   47 Ω for closed status / high impedance for open status

DIN-SYNC input :   DIN 41524 (5 pins / 180°) socket (pin Nr. 1: RUN signal, pin Nr. 3: CLOCK signal, pin Nr. 2: GND, pins Nr. 4 and 5 unused)
     Input voltage :   0 to +1,5 V for low level / +2,5 to +10 V for high level
     Input impedance :   50 kΩ for V_{IN} up to +5 V / 5 kΩ for V_{IN} over +5 V

MIDI input :   DIN 41524 (5 pins / 180°) socket (pin Nr. 4: + polarity, pin Nr. 5: – polarity, pins Nr. 1, 2 and 3 unused)
     Connection :   standard connection – current loop 5 mA

Electrical design :   under the regulations of the ČSN EN 60335-1+A55, ČSN EN 60335-2-45

EMC :   under the regulations of the ČSN EN 55014, ČSN EN 55020

Operating environment :   standard indoor - temperature +10 to +35 °C, relative humidity up to 85 %

INFORMATION FOR USERS ON DISPOSAL OF OLD EQUIPMENT AND BATTERIES [EUROPEAN UNION ONLY]

Equipment bearing these symbols should not be disposed as general household waste.

You should look for appropriate recycling facilities and systems for the disposal of these products.

Notice: The sign Pb below the symbol for batteries indicates that this battery contains lead.

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8   WARRANTY CONDITIONS

The equipment is provided with **thirty-months warranty** starting from the date of the equipment take-over by the customer. This date must be specified on warranty list together with dealer's confirmation.

During this period of time, all defects of equipment or its accessories, caused by defective material or faulty manufacturing, will be removed free of charge.

Warranty repair is asserted by the customer against the dealer.

Warranty period is to be extended for the time period, during which the product was under the warranty repair.

The relevant legal regulations take effect in case of cancellation of purchase contract.

The customer will lose the right for free warranty repair, if he/she will not be able to submit properly filled out warranty list or if the defects of the product had been caused by:

- unavoidable event (natural disaster),
- connecting the device to the incorrect supply voltage,
- inputs or outputs overloading by connecting the signals source or load source with not-corresponding characteristics etc.,
- faulty equipment operation, which is at variance with the instructions referred-to in the operating manual,
- mechanical damage caused by consumer during transportation or usage of equipment,
- unprofessional interference with the equipment or by equipment modification without manufacturer's approval.

This manual in PDF form is available at manufacturer's web pages.