Computer Jacquard System Technical Manual

Namad Parda Co.
Iran-Tehran

Tehran headquarters:
Tehran – Pasdaran – 1st Negarestan, #14
Zip Code: 1664614813
Tel: +98 21 – 22858069-22855706
Fax: +98 21 – 22859052
www.namad.parda.com
info@namad.parda.com

Table of Contents

Research & Development Dept.
Software Sec.
Edition: 2/0
Summer 2009

Introduction

Introduction
"Computer Jacquard System" is a complex system that is installed on carpet weaving machines and provides vast possibilities by eliminating punch card and replacing it by computer system.

In this system, rug design is done using an ordinary PC and common software. Design can be transferred to computer by floppy disk or Flash Disk (Cool Disk), thus the system provides the possibility to weave new design in a short time.

This Technical Manual is made for you to use the system in its best and to keep the system in working condition.

Systems functions
Computer Jacquard system changes the way weaving machine received its data for selecting color threads. Design is transferred to computer by floppy or Flash Disk (Cool Disk); computer sends the information to Rack Controller in each weaving cycle. Rack controller transfers this information to SBs, by column and row boards.

To use this manual one must common knowledge of mechanics and electronics.

System's main components:

Each system is made up of four main parts:

1. **Computer Unit**

   The unit is consisted of a common personal computer set. [computer chassis, monitor, keyboard, mouse].
   The computer is responsible to encode and transfer weaving information to mechanical and electronic parts of the system. Synchronization with weaving machine is done via the same computer and Interface Box.

2. **Control rack**

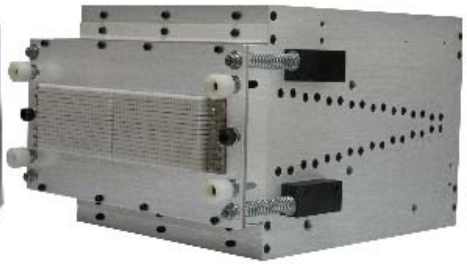
   Control Rack (Rack for short) is consisted of electronic boards and connectors responsible to transfer/received information from/to computer towards Needle Selection Box (Selection Box in short, or SB).

3. **Needle Selection Box (SB)**

   This unit houses mechanical and some electronic components and is responsible to control needle movements. The exact location of the needles in front of corresponding needle of the weaving machine is the most important part of every installation procedure.

   Modular design of this unit provides the ease of maintenance.

SB 1320- Solenoid

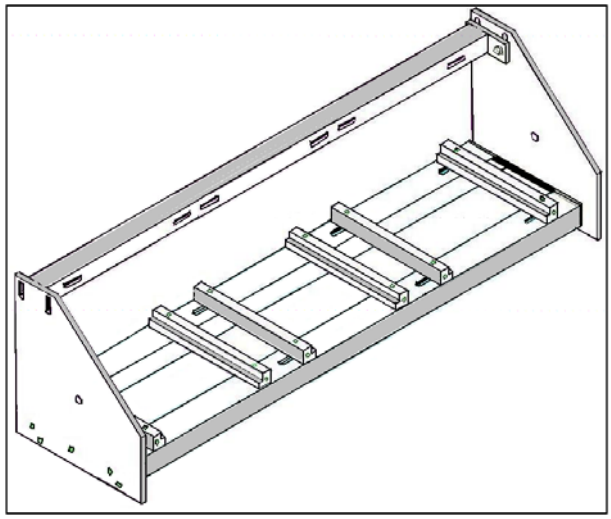


SB 880- Solenoid

Number of SB units are based on machine's specifications, length and the number of weaving jacquard.

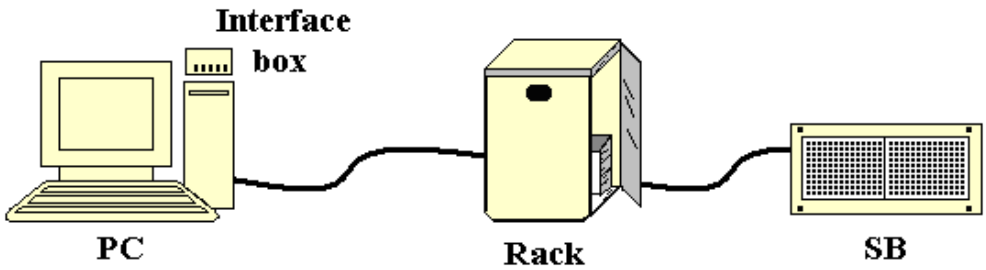
4. Movement transferring system: Chariot

Needle must be positioned, in every SB, precisely in front of corresponding jacquard needles. These needles must move back and forth exactly at the right time. The chariot keeps track the time the needles should be engaged and a thread should be or not be woven. Chariot works as a clock that harmonizes the correct time of the needles engagement.



Textima Chariot- Solenoid

Below a simplified schematic picture of a Namad Parda is shown.

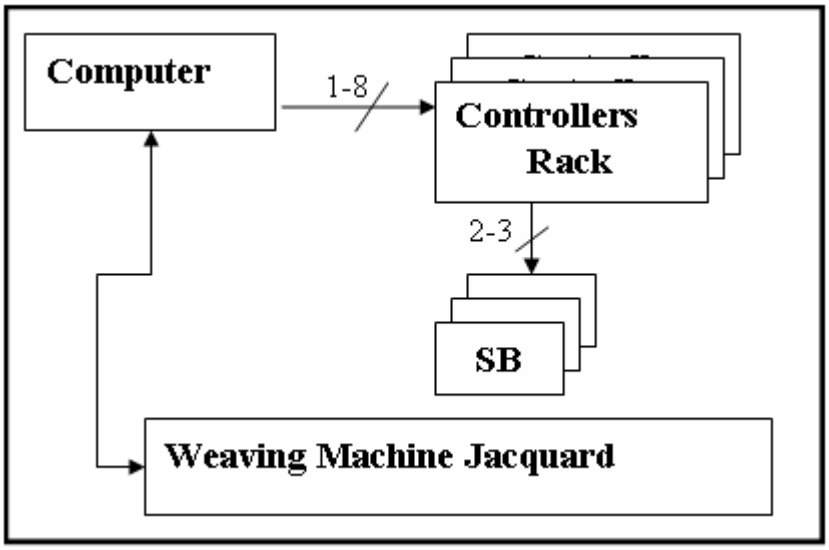


Schematics connection of Namad Parda system

Block Diagram of Machine

Simplified system components and their relations are displayed in following block diagram.

Note: Separate power supply is eliminated of production since 2004 to speed up installation and decreasing systems components.



Map of all external connections

Selection Box Controller Unit (Rack)

Needle SB controller unit includes a "9U" type rack that is made of following components:

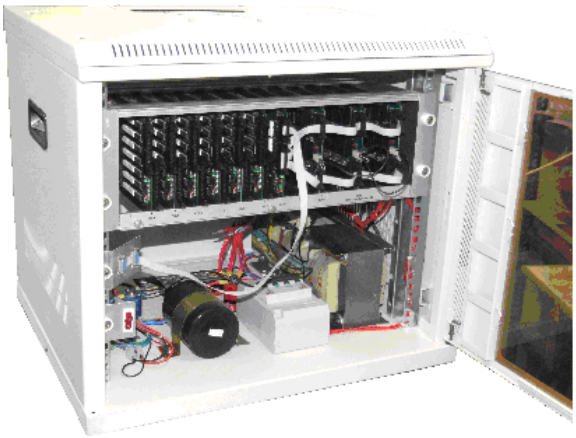


Figure 2: Racks profile and internal components

D–1 Terminal (connections)- Located behind the rack, 3 phase electricity is input via this terminal.

D-2 Miniature 3-phase fuse is used for protecting the rest of the components in the Rack, and also works as a switch.

D-3 SB Power supplies

D-3-1 A multilevel 3-phase transformer.

D-3-2 One 3-phase bridge rectifies the input electricity for SBs.

D-3-3 Capacitor eliminates the ripples.

D-3-4 20A fuse is used for protection.

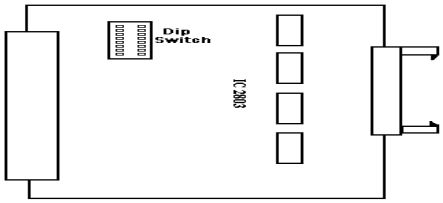
D-3-5 DC voltage (about 34V), is wired to a pillar and then is distributed from there.

D-4 Digital Power supply- Power supply provides +5VDC and +12VDC.

D-5 Shelf and Back-plain- Shelf and back-plain houses and connects 3 important boards, described below.

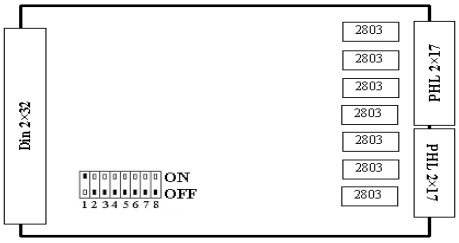
D-6 Column Board-

Before 2004 each rack could house up to 12 column boards. Each board provided commands for 28 output lines for 14 columns (half of a solenoids-frame) of solenoids.



Column board – before 2004

Since 2004 each rack houses up to 6 column boards. Each board provides commands for 56 output lines for 28 columns (a full solenoid-frame) of solenoids.



Column board, since 2004

*Note: Each solenoid needs 2 control lines for "in" and "out".

Each column board is hardwired directly to a column of solenoids in a SB.

A Dip-Switch is installed on each column board to distinguish between different column boards, each board has a specific Dip-Switch number assigned to it*.

Note*: To prevent mistaking column board's information, causing malfunction, make sure that the number is set correctly on each board.

Before 2004, each rack controlled up to 6 blocks of 28 columns, then each block needs two column boards, and each rack needed up to 12 column boards. Based on this, boards addresses were arranged from 0 to 11 and were ordered in shelf from left to right. This board had a Din 64M connector for input and one PHL34 for output.

Since 2004, each rack controls up to 6 blocks of 28 columns, then each block needs one column board, and each rack needs up to 6 column boards. Based on this, boards addresses are arranged from 1 to 6 and are ordered in shelf from right to left.

This board has a Din 64M connector for input and two PHL34 for output.

D–5–1) IC, Solenoids Driver

Before 2004, there were four IC-2803 in each column board that provided desired current for solenoids. In this design each IC controls "in" and "out" commands for 4 solenoids. ICs control each solenoid-frame in up to down and right to left directions only, and the last IC controlled only two solenoids.

After 2004 in newer Column Board design, each column board has seven IC-2803. Following table shows related solenoids and IC drivers on the board:

IC	Solenoids
UR 1	1, 2, 3, 4
UR12	5, 6, 7, 8
UR13	9, 10, 11, 12
UR18	13, 14, 27, 28
UR23	23, 24, 25, 26
UR28	19, 20, 21, 22
UR23	15, 16, 17, 18

Figure3: Solenoid and drivers table-since 2004

D–5–2) LED 34V- A red LED, on the board, indicates existence of voltage of solenoid's supply in the board.

D–5–3) LED REN - A green LED, indicates that solenoids command is active. It blinks at work time.

D–5–4) Dip-switch - Dip-Switches are used to differentiate address of each column board. Location of dip-switches on the board and arrangement of addresses are as follows:

Before 2004

Note: Keys number 5, 6, 7, 8 are not used.

Dip-Switch arrangement of address selection is as follow:

Column Board	Address	ON	OFF
1	0	1 , 2 , 3 , 4	-
2	1	2 , 3 , 4	1
3	2	1,3, 4	2
4	3	3, 4	1, 2
5	4	1, 2, 4	3
6	5	2, 4	1, 3
7	6	1, 4	2, 3
8	7	4	1, 2, 3
9	8	1, 2, 3	4
10	9	2, 3	1, 4
11	10	1, 3	2, 4
12	11	3	1, 2, 4

Dip-Switch arrangement – Before 2004

Since 2004

Note: Keys 7 and 8 are not used.

Dip-Switch arrangement of address selection is as follows:

Column Board	Address	ON	OFF
1	1	2, 3, 4, 5, 6	1
2	2	1, 3, 4, 5, 6	2
3	3	1, 2, 4, 5, 6	3
4	4	1, 2, 3, 5, 6	4
5	5	1, 2, 3, 4, 6	5
6	6	1, 2, 3, 4, 5	6

Dip-Switch arrangement since 2004

D–6) Row board

Row boards provide current for 1st to 16th rows in SBs.

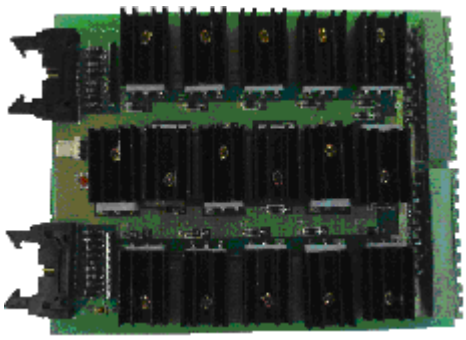
Before 2004, there were 8 transistors on each board which were packed on a heat sink. Each board used to drive 8 rows. Since each SB had 16 rows thus 2 boards were needed for each SB.
2 Row Boards are connected to one SB via two 10 wire Row Cable.

> Note: The first two pins of each 10 pins connector are row board power input, which comes from the pillar.

Row Boards are connected to each other and Micro-Board inside Rack Controller. Micro-Boards are responsible to feed Row and Column boards. Row boards inputs come from Micro-Board via a PHL-10.

Since 2004, 16 transistors are installed on 16 separate heat sinks, on each board. Since each SB had 16 rows thus 1 board is needed for each SB.

1 Row Board is connected to one SB via two 10 wire Row Cable.



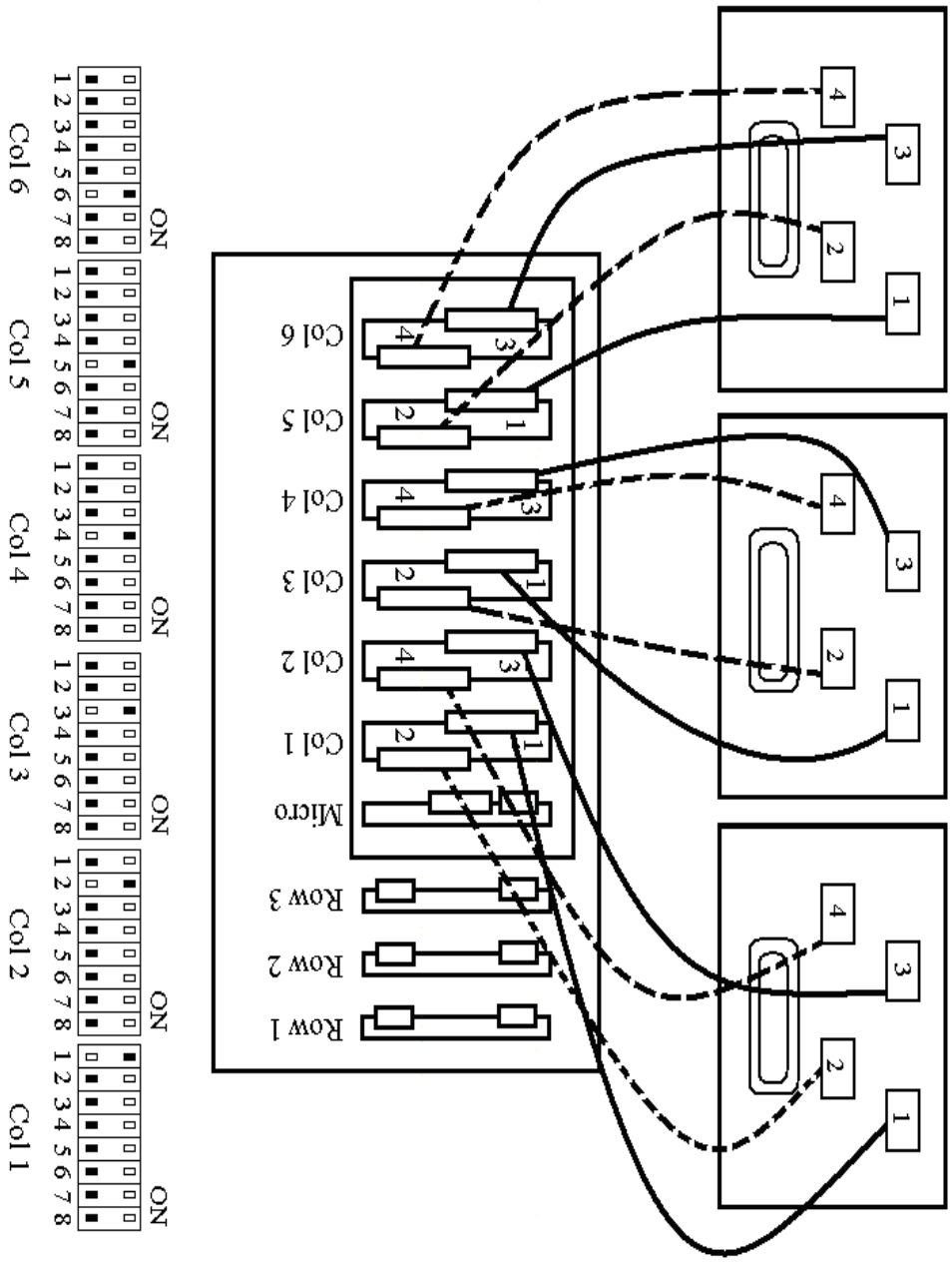
Row Board

> Note: The first pin of each 10 pins connector is row board power input, which comes from the pillar.

Row Boards are connected to each other and Micro-Board inside Rack Controller. Micro-Boards are responsible to feed Row and Column boards. Thus row board inputs come from Micro-Board via two PHL-10.

While connecting SB to rack we must note that inputs of row boards join together. Other wise the current loop wont be closed and SB will not work.

Boards in the rack are connected to SBs by cables in order shown in the figure . Failing to properly connect Rack to SBs results either the system not to work at all or malfunction.



The components arrangement can be observed in figure.

D–7) Micro Boards

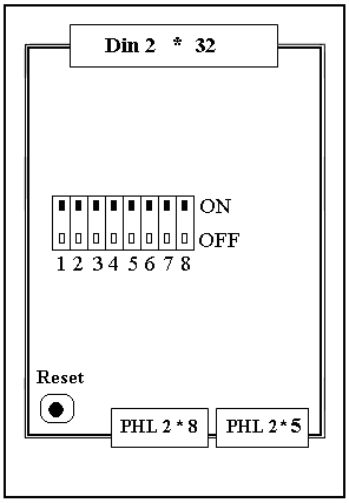
This board has three main functions:

1. Communicating with computer to receive weaving information. Selecting appropriate data, based on the Micro Board address.
2. Sending weaving data to each column board.
3. Selecting appropriate row to latch column data to corresponding rows for all SBs attached to a Rack.

Each micro board has a specific address similar to the rack number set by Dip-switches on Micro Board.

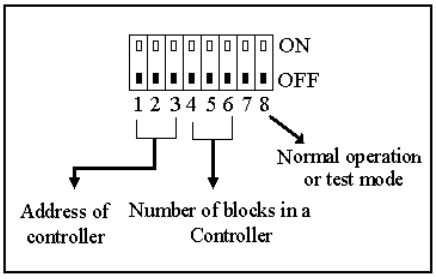
> *Note: Dip-switch arrangement is very important, mistakes in setting addresses causes machine 1) not to operate at all, 2) or weaves scrambled rug design.

Location of Dipswitch on Micro Boards is shown below:



Micro Board Dip switch diagram

Order and description of the switches groups are shown in the figure below:



Dip Switch description

Address of boards in different controllers should follow the table below, key 8 must be set to ON for normal operation mode.

Controller Address	ON	OFF
1st controller	1, 2, 3	-
2nd Second controller	2, 3	1
3rd Third controller	1, 3	2
4th Fourth controller	3	1, 2

Address selection for Micro Boards

Keys number 4, 5 and 6 are used to set number of blocks that are controlled by a Micro Board. Normally for machines with 6 bands per controller, key 4 is ON and keys 5 and 6 are OFF.

Key 8 is used to change the mode of Micro Board from normal operation to test mode.

Following table shows key positions for 4 different test modes.

Test mode	Key # 1	Key # 2
Row	Off	On
Column	Off	Off
All – in	On	On
All - out	On	Off

Connections of micro-board are as follows;

PHL 2*5- This connector is for serial communications and is connected to rack's internal serial port.
PHL 2*8- This connector is connected to Row Boards.
Din 2*32- Trough this connector a) power for the board is supplied, b) Data and addresses for column boards are sent via back plain.
Reset key- Resets the Micro Board.
LED +5V- Is a red LED that is on the board and indicates existence of +5v voltage in board.
LED RX- Indicates receiving data from PC.
LED TX- Indicates sending data to PC.
LED REN- Is green and indicates that solenoids are activated, must blink momentary.

Interface Box

Interface box is designed to harmonize SB functions to weaving machine cycle. Namad Parda Software is developed to manage all the needed tasks for defining colors and types of weave. This complicated software needs to harmonize needles in every SB with the cycle of the weaving machine. Cycle information is sensed by sensors (Proxy). Each cycle shows the weaving machine status. By installing certain amount of sensors Namad Parda software recognizes the exact time for needles to be activated.

Different tasks of Interface box are as follow:

1- Sends weaving information from software to Micro Board.
2- Sensors send the cycle of weaving machine to this device.
3- Stop Relay shuts down the weaving machine in various conditions.

1- Sends weaving information from software to Micro Board.
This device is connected to serial port of PC via a Cat-5 cable, and to the proxies and stop relay via double twisted pair cables.

*Note: One on the double twisted pairs are for power which is derived from PC.

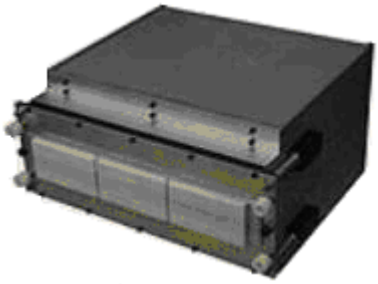
2- Sensors send the cycle of weaving machine to this device.
Sensors are responsible to sense the cycle of weaving machine. Installing sensors in its proper place is crucial for correct weaving status. Manipulating any of the sensors will make the weave be done defective. Keeping sensors clean and tidy is important for healthy weaving.

3- Stop Relay, shuts down the weaving machine in various conditions.
Stop Relay will stop the weaving machine if the connection between PC and Micro Boards are disconnected.

According to the different types of weaving machines two or four proxies are used. Each proxy sends one of the machine cycles to PC assuring that the weft and woof are weaved in the correct cycle.

To weave a correctly weaved carpet all the connections from and to the Interface box should be healthy

E) Needle Selection Box (SB):

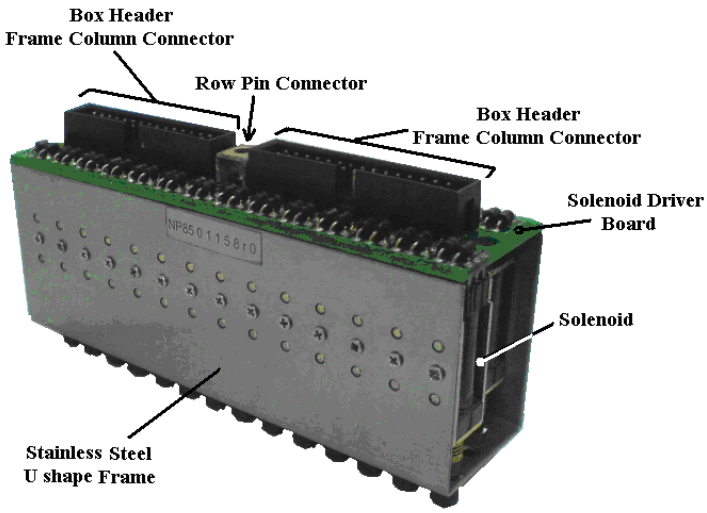


SB 1320

Needle selection box houses up to some 48 solenoid-frames that are arranged as 16×3 for 1320 boxes or 16×2 for 880 boxes.

In 1320 SB there are 6 connectors for columns (**SB column connector**) and one for row (**SB row connector**). In 880 SBs, there are 4 connections for column and one for row.

Solenoid-Frames



A complete Solenoid-Frame

Solenoid-frame houses up to 28 solenoids inside a stainless steel U shape frame and a driver board. On the top there is a PCB that connects solenoids to two Box Headers (**Frame column connector**) and a **Row pin-connector**.

Outlets/Inlets of a SB

All solenoid-frames row pin-connectors in a row are connected to each other and finally to a single pin in SB row connector via a special wire **(Internal Row** Cable**).**

All solenoid-frames Frame column connector in a column are connected to each other and finally to a SB column connector via a flat cable (Internal Column Cable).

Row cable and Column cables connects Rack to SBs.

Inside every SB, 8 rows are placed on top and 8 rows in bottom.

F) System's central computer:

Computer works as a control and command device between user and machine.

Computer components:

F–1) Computer box:

Standard equipments (hardware plus operating system) of a PC.

F–2) Control software:

Specific software developed in Namad Parda to control weaving.

F–3) Interface box:

Interface box is set on top of computer chassis providing proper bilateral connection between computer and rack. This device is made up of 3 separate parts:

a) First part is connection to serial communication port,
b) Second part controls stop relay which stops machine in emergency times,
c) Third part is related to input of proximity switch signal.

Interface is powered up using computer's power supply.

Proximity SW is used to synchronize weaving machine with central computer in the way that computer sends it s information to rack controllers and then to solenoids after receiving signals of proximity SW 1, 2. Receiving signals of proximity SW 1 & SW 2 is one of interface boards responsibilities. Diagram and profile of interface board can be observed in figures 9 – 10.

Figure:

G) Systems connections:

G–1) Interconnection column cable:

34 fiber flat cables, each 2.5 meters, make an interconnection column cables. 4 cables make the interconnection cable for 880 systems; 6 cables make the interconnection cable for 1320 systems. To protect the cables they are put inside a heavy duty elastic cover.

One end of this cable has an IDC 2 * 17 and the other end has a 36 pin male Centronix. IDC connectors are connected to the Column boards and Centronixes are connected to SBs.

Cables are joined to SB from right to left order. Every cable has a number that should be connected to the corresponding connection on the back of each SB (see the figure below).

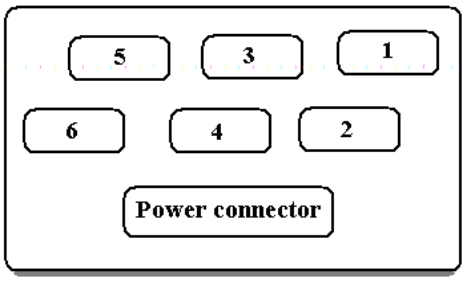


Figure: Back of SB, with sockets

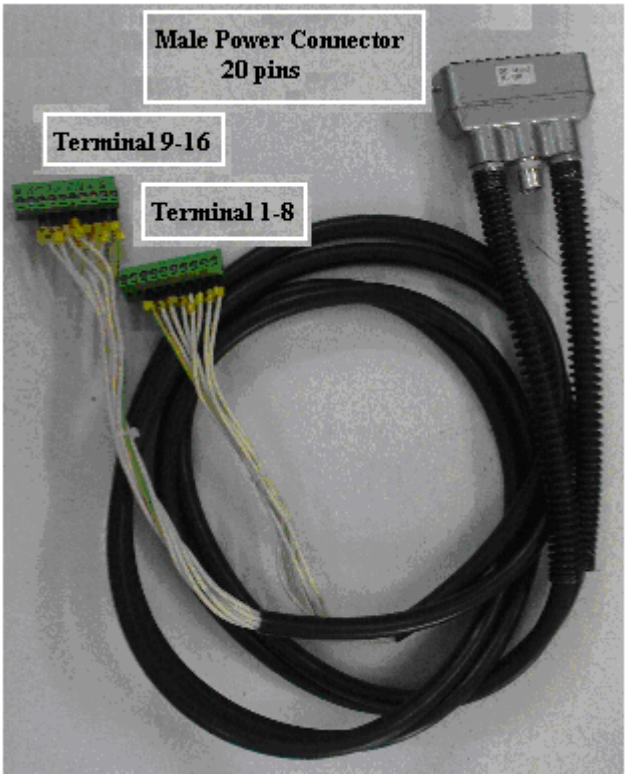
G–2) Interconnection Row cable:

This cable makes interconnection between SBs and row boards.

The Row cable is made up of 8×1 cables. At one end a 20 pin power connector is attached and at the other end two 10 pin female connectors are attached.

Each of these two connectors are joined to a row board connector.

Note: Two first connections of 10 pins connector are power supply voltage.



Interconnection Row cable

G–3) Serial cable in controller

Connection between interconnection serial cable and serial port of micro board on control rack is possible by this cable.

G–4) Medium serial cable

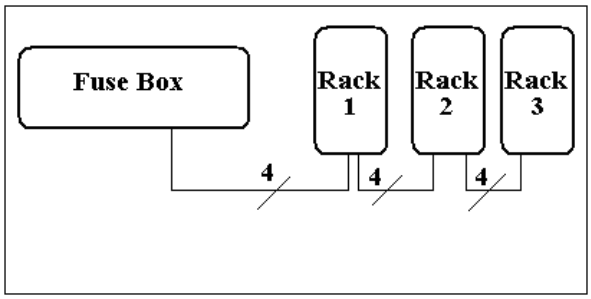
Is a nine fibers cable with two D9 connectors and is used for relation of serial between two racks.

G–5) Computers serial cable

Is similar to medium serial cable, but its length is twice the length of medium serial cable, and is joined to first rack from Interface Box.

G – 7) 220V Cable:

This cable is 4 fibers of 1.5 which are joined together as follows:



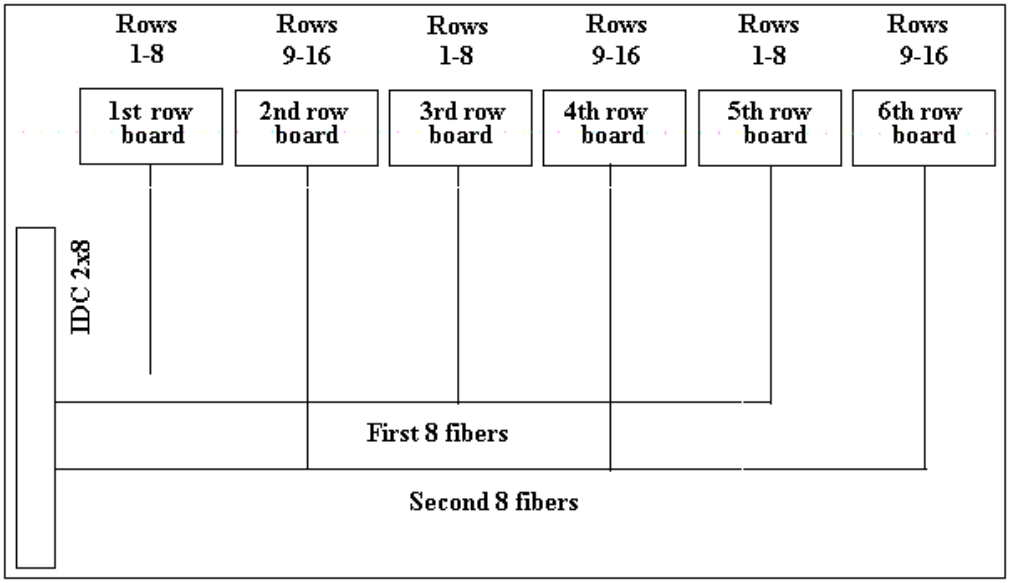
Connecting Racks to Fuse Box

In modern systems (since 2004) this cable is replaced with a 380 V cable by 3 phase and the first rack is connected to Fuse Box, directly.

G–8) Command cable of row

Connection of row board and micro board is done by this cable. One of this cables end is an IDC 2×8 and the other is an IDC 2×5.

In different spaces that IDC 2×8 connector and the other and is connected to PHL 2×5 connectors of each row boards as follows .



H) Mechanical arrangements

Mechanical arrangements include following items :

H–1) SB installation

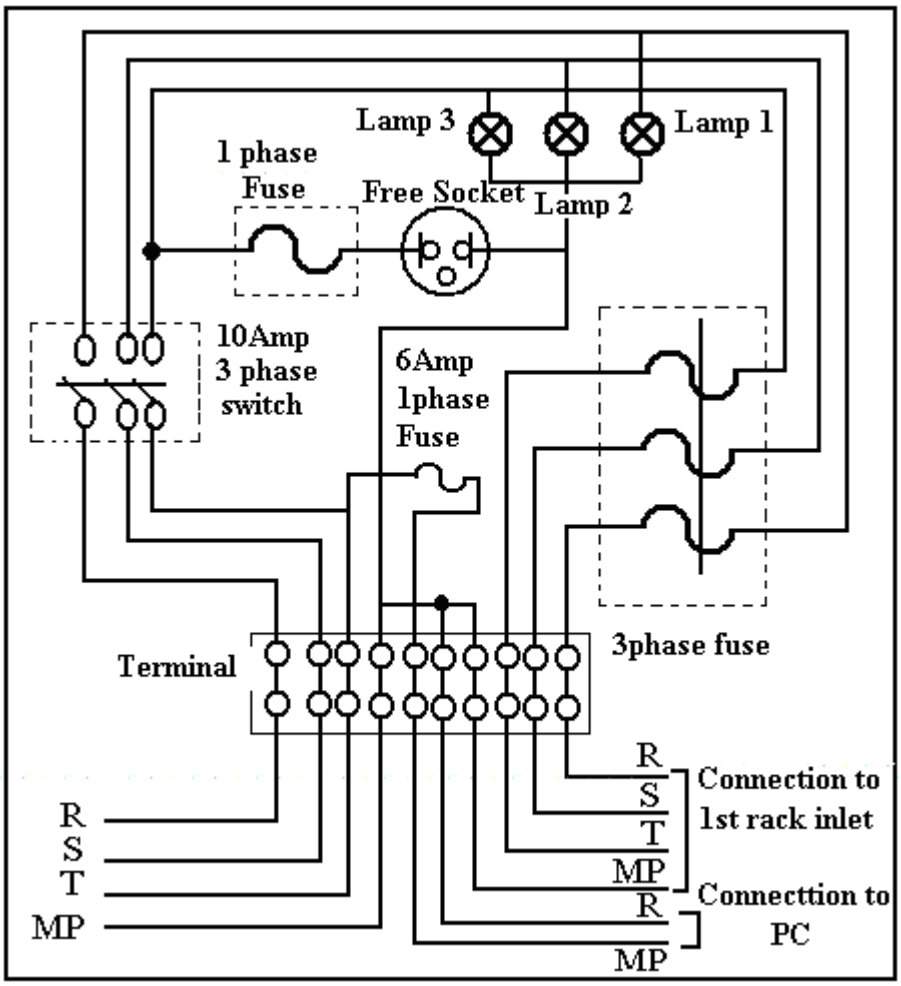
a) SB must be located exactly in relation to jacquards needles.
b) Up and down arrangement of SB is done by arranging the chariot .
c) Left and right arrangement of SB s is done by stairs, which the SB is screwed on them.

H–2) Installing SB

a) SB must be quietly fixed regard to coach
b) Fixing SB on coach is possible by closing related Alen screws to U – frame and stairs of SB.

H–3) Pressure regulations

a) Arranging connecting shafts while system is under pressure, checking operated and unoperated platines of weaving machine.
b) Pressure of SB must not be more than usual because leads to curving of SBs needle.



3 Phase Power plan