<Specification of Auto Tee-up(GT-A)'s Main Motion>

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1. Basic Composition & Specifications

GDR(PC), 2 key-pads and FND module are composing the basic system.

1) Two-way traffic connection with GDR Client

It uses the datas of finding traffic port, checking balls, adjusting the height of tee.

- Method of traffic : RS232

2) It controls each tee-up with main control PC (give operation time, turn ON/OFF the power)

3) 2 key-pads & FND module

(A) 2 key-pads & FND

- Composed of 2 key-pads : UP(left) / DOWN(right)
- FND digit : 3-digit
- It marks the height of tee for 1.5 sec and resets when adjusting tee height.
- It marks the time basically on FND when the GDR is not linked(time setting), and marks the height of tee for 1.5 sec and resets when changing tee height.
- It marks the error code and the connection state with GDR. (refer to the alarm code)

(B) Setting switch

- SW1(M/A) : Setting the way to supply balls to manual or auto (in normal mode)

-SW2(GDR/Normal) : Option of link with GDR or not

-SW3(OFF/ON) : Control of the power of key-pad

4) Controller of ball supply : MAIN

(A) Motor controller of ball supply(J6)

(1) DC reduced motor : BOAI LRS-545-24V-6500, 24V 6,500RPM

(2) Operation control of ball collector

1) The tee moves up and down when there is no ball on tee base once the power is on.

2) After the first beginnig motion, it goes down to receive the ball and it keeps stop motion until the starting point sensor senses ball by the spin of rotational plate. When the starting point sensor senses ball on tee and the motor of rotational plate stops, the motor of tee-up moves and the tee-up moves up to provide balls.

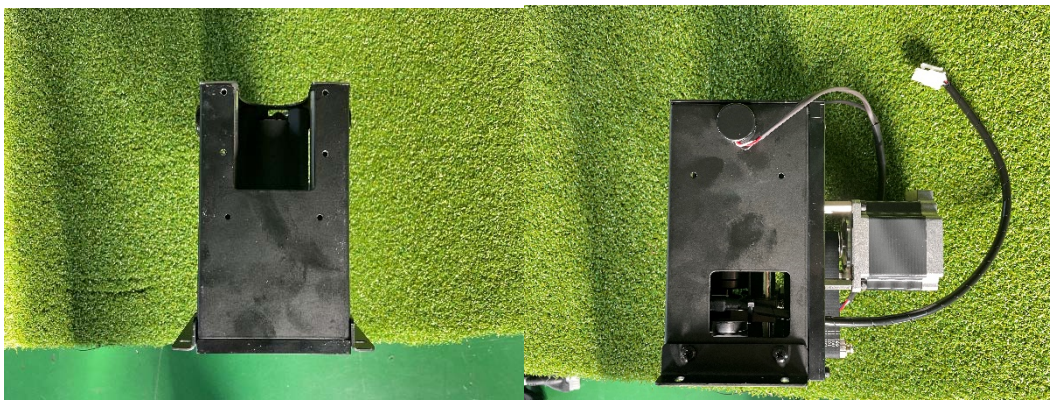
3) If it doesn't senses the ball on tee operating normally, the ball providing motor moves consecutively for 12 sec. After 12 seconds, if it doesn't still senses the ball, you shold stop the motor of providing ball and put some balls, then it will works normally after pushing the key-pad's button of UP/DOWN.

4) It performs backspin(about 5mm) right after sensing ball on tee.

5) The ball stucking(overload) is correspond to the current detection over 1.5A of an overcurrent setpoint. The motor of providing ball moves normal spin and backspin three times when the current keeps the level for 1.5 sec. It will stops and marks the alarm code of 'E-1' until it doesn't provide balls normally in total 3 times.

6) The cumulated overload sensing will reset after moving 2 times normally.

(B) Motor controller of auto tee-up(J6)



(1) Stepping motor : NIDEC KH56KM2U262, 3.6V

(2) Motion control of tee-up motor

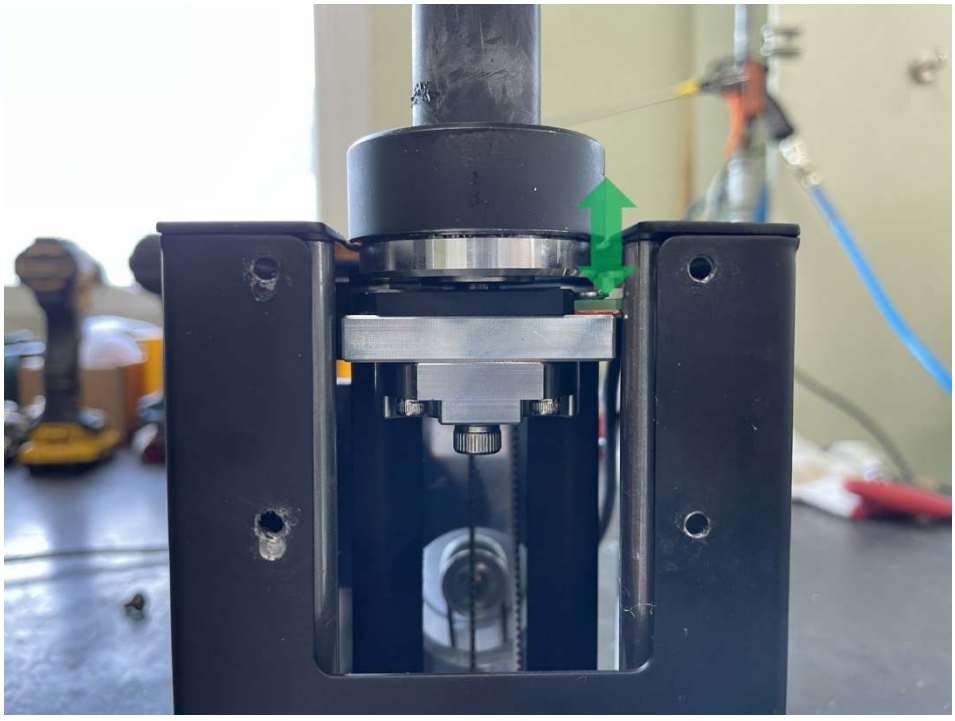
1) The stepping motor controlls by normal spin and backspin in each position when it receives the data of moving position at the starting point sensor(photo sensor).

2) The tee moves up and down one time when there is no ball on tee base once the power is on.

3) At the status of tee goes down after the first beginning motion, the tee-up motor stands by. When the ball is provided on tee by rotational plate and the side sensor senses ball, the tee-up motor spins and the tee base goes up and provides balls.

4) After going up, there is no ball on tee, the magnetic sensor is released and the tee-up motor backspins and the tee base goes down.

5) The tee base goes down and repeats the things of 3).



(C) Control of tee height

- Function of checking the starting point when power is ON/OFF

Height of tee	0 Starting point	unused	25	30	35	40	45	50	55	60 Upper limit
Data	X06	X0A	X0B	0X0C	0X00	0X01	0X02	0X03	0X04	0X05

(1) Position control of 7 levels

(2) Basic 9 sections / Real height (including mat)

1-0X05(60mm-Upper limit) / 85mm

2-0X04(55mm) / 80mm

3-0X03(50mm) / 75mm

4-0X02(45mm) / 70mm

5-0X01(40mm) → default / 65mm

6-0X00(35mm) / 60mm

7-0X0C(30mm) / 55mm

8-0X0B(25mm) / 50mm

9-0X06(0mm-Starting point)

(D) Sensing method

(1) Time limit for stepping motor's motion and detection of starting point/position/upper limit

(2) Sensing of starting point : photo sensor, sensing of starting point at the bottom

(3) Sensing of upper limit : Sensing from stepping motor's overload

(4) Sensing balls : Sensing the weight of ball with magnetic sensor when the ball is on tee

(5) Control of collector : Sensing the ball with light diode sensor on the side

5) Specifications of AC input and DC output

(A) AC INLET (fuse, noise filter, ON/OFF switch)

(B) SMPS (DC24V, 4.5A)

6) Control Interface Port

(A) PC traffic PORT

(1) RS232 traffic : connect with GDR PC

(2) RS422 traffic : control the tee-up from main PC (Maximum of 255EA tee-ups)

(B) FND 2Key PAD PORT

(C) Tee changing button

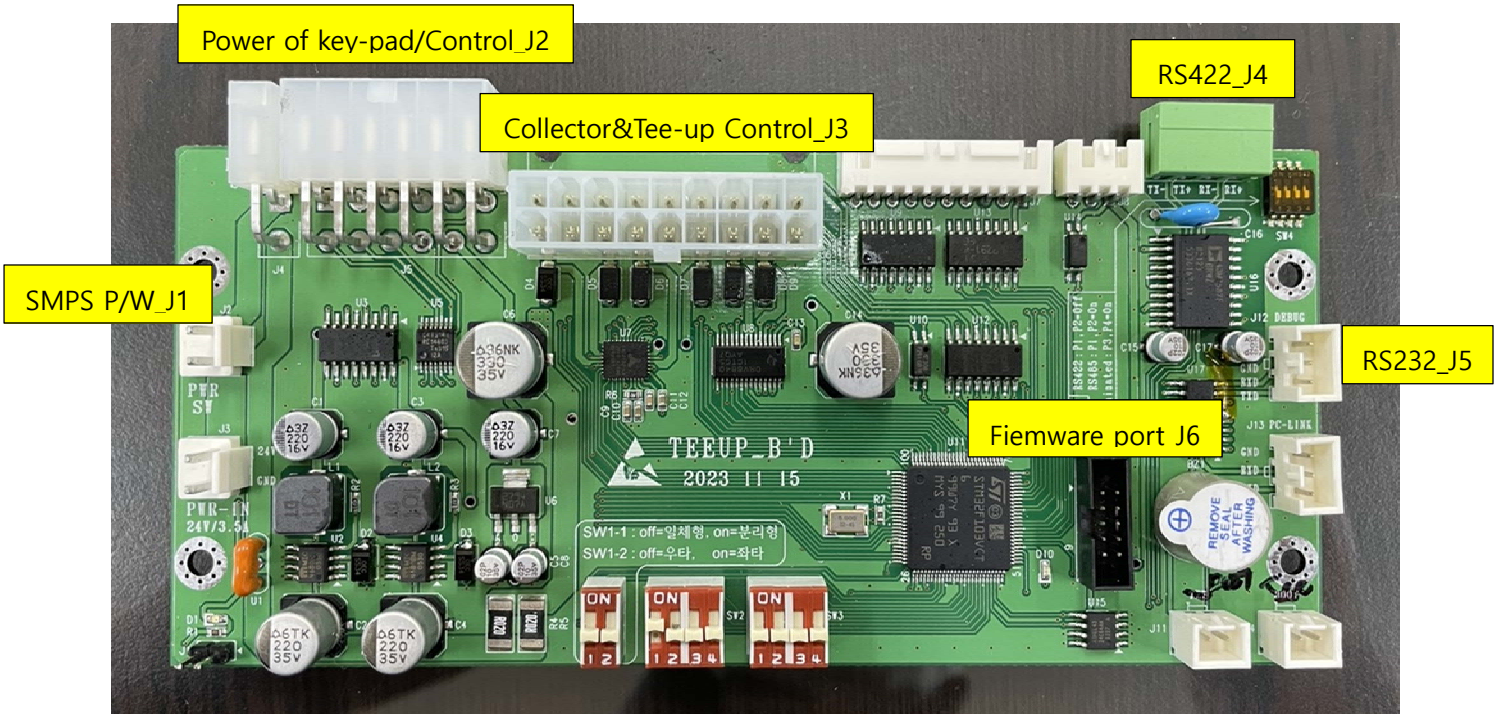
7) System Update

(D) Firmware Download

(1) Download the fimeware through RS422 traffic

(2) Download the firmware through connector of MAIN BOARD ‘J5’

8) Composition of main PCB



2. Specifications of normal motion

1) Main function

(A) When the power is ON, it marks the version of firmware for 1 sec and go into GDR connection mode automatically. (depends on state of 'GDR' or 'normal' switch)

(1) There is no mark on key-pad when GDR is connected. (marking height of tee with UP/DOWN button)

(2) Push the 'GDR/normal' button when you set up the connection with GDR or not.

(B) It senses the starting point and height of tee.

(C) It marks the "information of version, GDR, height of tee, time" on FND.

(1) GDR mode : turned off after showing the version

(2) normal mode : mark '---' or counting time

(D) Auto/Manual mode of ball supply

(1) Conneted with GDR (predefined protocol)

(2) Not connected with GDR

● Auto : Supply balls on rubber tee at all times (the tee goes up with ball automatically)

● Manual : Stand by at the starting point with ball and the tee goes up when it senses any key-pad button.

(E) Function of forced ball supply : apply on connection with GDR

In case of connection with GDR and the ball is not supplied, push any ke-pad button. Then the tee goes down to starting point, and the tee will goes up with ball automatically. If there is no ball, it will moves the rotational plate and goes up with ball on tee in order.

(F) Function of central control (control the main PC and tee-up)

(1) Give self motion maintaining time not related to GDR client.

- After the maintaining time, tee-up goes to sleep mode. (marking count on key-pad)

(2) Function of turning ON/OFF the tee-up

(G) Function of adjusting height of tee

(1) Conneted with GDR (predefined protocol)

- It moves the tee height by the data from GDR.

(2) Not connected with GDR

- It moves up and down step by step when you push the UP/DOWN switch.

- It marks the height on FND for 1.5 sec when you adjust the level of tee.

(H) Sensing of ball hitting

(1) Conneted with GDR (predefined protocol)

- Judge by the signal whether there is ball or not

(2) Not connected with GDR

- Sense by weight of ball

- It receives ball after going down automatically when you hit a ball. And then the tee goes up on auto mode, and the tee stands by at starting point after pushing key-pad's button on manual mode.

(I) Function of an emergency alarm

(1) Function of warning buzzer and error message

(2) It marks overload and error of starting point on FND or sounds buzzer (refer to the alarm code)

※ Occurrence and sign of errors : Using FND and buzzer

<Alarm code>

State	Marking on FND	Buzzer	notes
Overload alarm	E-1	sound 1 time by 0.5 sec when it senses overload	When the rotational plate of collector is not available to work 3 times consecutively (If it works 2 times normally, it resets the cumulative number)
Error of tee down (starting point)	E-2	sound 3 times by 0.5 sec	1. Power on : not sensed on the starting point of bottom over 14 sec 2. In use : not sensed on the starting point of bottom over 4 sec
Marking version of firmware	F-4	none	Marks for 1 sec and turns onto GDR/normal mode
The first power ON	none	sound 2 times by 0.5 sec	

FCC Information

This device complies with part 15 of the FCC Results. Operation is subject to the following two conditions :

(1) This Device may not cause harmful interface, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for CLASS A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipmentgenerates, uses, and can radiate radio frequency energy and, if not installed and used in accordancewith the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.