



**TRAINING MANUAL  
FOR  
FCC1  
FIRE CONTROL CONSOLE 1**

May 2015

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## 1. GENERAL DESCRIPTION

FCC1 is the key system composition equipment in retrofit of KRI-376 project. It can receive target indication data and control command from TCC; spare target indication data from MR36A; target tracking data from EO tracker and MR35 tracking radar; parameters as motion, attitude and weather of own ship from synthetic information exchange cabinet. Then, it calculates motion parameter of target in real time; compute encounter data of shell and target as well as firing data; command and control a 730B gun to intercept coming air target or attack surface target.

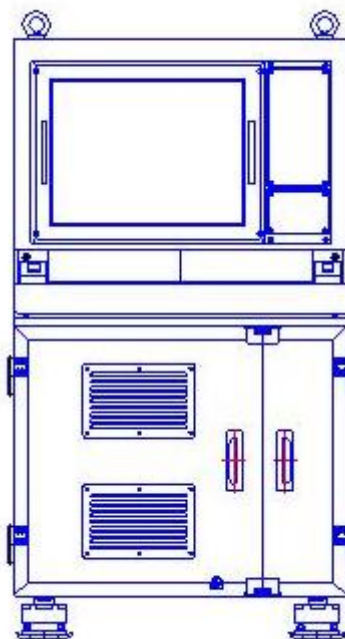


Figure 1-1 FCC1 schematic diagram

## 2. MAIN FUNCTIONS

- FCC1 can control 730B gun in remote control mode: including remote control power-on, fire control power-on, turn-on, turn-off, reset, fire, etc;
- To receive the tactical instruction, target indication and other information sent by the TCC to control gun to perform rapid pre-rotation and send state information of gun to the TCC;
- in real time, receive tracking data of target sent by EO tracker and MR35 tracking radar and receive own ship motion and attitude parameters sent by the synthetic information exchange cabinet, conduct adaptive smoothing filtering processing for data and get target motion parameters;
- To calculate the encounter data of shell and target through performing fire control calculation to get firing data rapidly and accurately for controlling gun to accurately indicate to future point of target and fire;
- To receive spare target indication data sent by MR36A;
- Have virtual fire function;

- Have zero flight time check mode;
- have various static and dynamic check operating mode, it can fulfill functions as controlling gun in jumping mode check state, constant velocity mode check state and sine mode check state;
- To receive weather information and perform trajectory weather information correction;
- To use situational image, TV or infrared image of EO tracker to display data of target and own ship and contents concerning data and state parameters of FCC1 and equipment related to FCC1;
- Have data record function.

### 3. MAIN TECHNICAL SPECIFICATIONS

To simulated surface target route (the surface ship moving in straight-line with constant-speed, target speed of 30m/s, shortcut of 500m, in statistical range of 3000m~500m), the calculating accuracy of fire control will be:

- Azimuth: system error (m)  $\leq 1.5\text{mrad}$ ;  
random error ( $\sigma$ )  $\leq 2.0\text{mrad}$ ;
- Elevation: system error (m)  $\leq 1.5\text{mrad}$ ;  
random error ( $\sigma$ )  $\leq 2.0\text{mrad}$ .

To simulated air target route (the airplane flying in straight-line with constant-speed, target speed of 0.9 mach, shortcut of 500m, in statistical range of 2000m~500m), the calculating accuracy of fire control will be:

- azimuth: system error (m)  $\leq 1.4\text{mrad}$ ;  
random error ( $\sigma$ )  $\leq 1.85\text{mrad}$ ;
- elevation: system error (m)  $\leq 1.0\text{mrad}$ ;  
random error ( $\sigma$ )  $\leq 1.85\text{mrad}$ .

Time synchronization period of fire control:

- 20ms.

## 4. OPERATING PRINCIPLE

Power on FCC1, then, perform startup self-check, start initialization setting. Operator can conduct man-machine interaction by input modules such as programmable touch keyboard, track ball and gun operation module after initialization. At the same time, FCC1 performs real-time communications and information exchange with 730B gun, EO, MR35, TCC, SIE and time synchronization equipment via network interface, digital interface, analog interface and video interface. Process target information, hull motion information and weather information; perform encounter solution and firing data calculation; finally, control 730B gun to attack air/surface targets.

There are two control mode of FCC1, they are system control mode 【SYS CTRL】 and local control mode 【LOCAL CTRL】. 【SYS CTRL】 is the default mode during startup and initialization. Flow diagram is shown in figure 4-1.

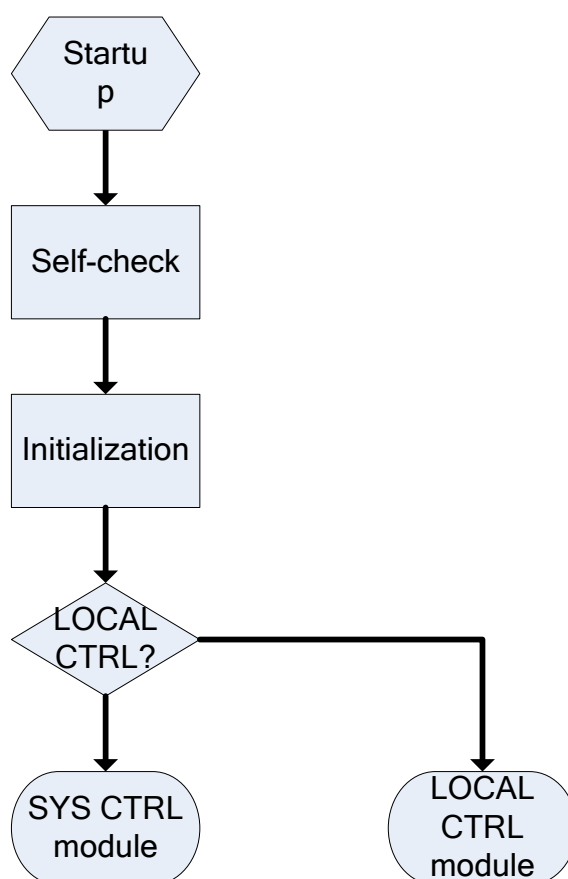


Figure 4-1 Flow diagram

### 4.1 Operating Principle of System Control

FCC1 is controlled by command and control system when FCC1 is in system control mode. It takes orders from TCC and receives target indication data, operating mode and command of firepower channel organization from TCC via network; receive tracking target data sent by tracker designated by TCC, command and control 730B gun to attack or train.

## 4.2 Operating Principle of Local Control

FCC1 is not controlled by command and control system when FCC1 is in local control mode. It does not take order from TCC, FCC1 is in independent operating state and control EO (when EO is in remote-control state).

In local control mode, FCC1 has two operating modes, they are **【Combat】** and **【Check】**.

### 4.2.1 **【Combat】** Operating Mode

In **【Combat】** operating mode, there are 5 operating states: wait operating state, target indication operating state, autonomous operating state, direct attack operating state and virtual fire operating state.

- wait operating state: in wait operating state, FCC1 is in wait state, send “stop at the current position” order to 730B gun, send wait operation order to EO;
- Target indication operating state: in target indication operating state, FCC1 can autonomously select target indication source and receive target indication information. The target indication sources are: target indication set by FCC1, target indication of TCC, target indication of MR35 tracking radar and spare target indication of MR36A. FCC1 controls prerotation of 730B gun based on the received target indication information, sends target indication information and target indication operation order to EO at the same time. After EO acquired and tracked target, FCC1 calculates target motion parameter and encounter data of shell and target as well as firing data in real time according to target tracking data send by EO and parameters as motion, attitude and weather of own ship, commands and controls 730B gun to attack target.
- Autonomous operating state: in autonomous operating state, FCC1 can autonomously select tracker (EO or MR35) as target tracking data source, send autonomous operating order to EO at the same time. After the selected tracker acquired and tracked target, FCC1 calculates the target motion parameter and encounter data of shell and target as well as firing data in real time according to target tracking data send by tracker and parameters as motion, attitude and weather of own ship, commands and controls 730B gun to attack target;
- Direct attack operating state: in direct attack operating state, FCC1 can set the GPS position information of the attacked target, combining the GPS position information of own ship to acquire position information of the attacked target relative to own ship, send the position information and direct attack operating order to EO at the same time. FCC1 calculates firing data based on position information of the attacked target, commands and controls 730B gun to attack target ;
- Virtual fire operating state: in virtual fire operating state, FCC1 can set virtual target information, send the virtual target information and virtual fire operating order to EO at the same time. FCC1 calculates firing data based on virtual target information, commands and controls 730B gun to perform virtual fire ;

#### 4.2.2 【Check】 Operating Mode

In 【Check】operating mode, there are 10 check operating states to perform check for single equipment and system. They are static check operating state of EO fire control system, dynamic check operating state of EO fire control system, static check operating state of EO fire control semi system, dynamic check operating state of EO fire control semi system, joint operation check operating state of FCC1 and 730B gun, control gun in jumping mode check operating state, control gun in constant speed mode check operating state, control gun in sine mode check operating state, single static check operating state of FCC1 and single dynamic check operating state of FCC1

- Static check operating state of EO fire control system: in this operating state, FCC1 generates static check problem and controls EO and 730B gun to conduct system joint operation according to problems, performs statistics for system error and random error;
- Dynamic check operating state of EO fire control system: in this operating state, FCC1 generates dynamic check problem and controls EO and 730B gun to conduct system joint operation according to problems, performs statistics for system error and random error;
- Static check operating state of EO fire control semi system: in this operating state, FCC1 generates static check problem and controls EO to conduct joint operation according to problems, performs statistics for system error and random error;
- Dynamic check operating state of EO fire control semi system: in this operating state, FCC1 generates dynamic check problem and controls EO to conduct joint operation according to problems, performs statistics for system error and random error;
- Joint operation check operating state of FCC1 and 730B gun: in this operating state, FCC1 generates check problem and controls 730B gun to conduct joint operation according to problems, performs statistics for system error and random error;
- Control gun in jumping mode check operating state: in this operating state, FCC1 generates control gun in jumping mode check problem, and controls 730B gun to conduct jumping motion according to problem;
- Control gun in constant speed mode check operating state: in this operating state, FCC1 generates control gun in constant speed mode check problem, and controls 730B gun to perform constant-speed motion according to problem; conducts statistics for system error and random error;
- Control gun in sine mode check operating state: in this operating state, FCC1 generates control gun in sine mode check problem, and controls 730B gun to perform sine motion according to problem; conducts statistics for system error and random error;
- Single static check operating state of FCC1: in this operating state, FCC1 generates static check problem, and performs static problem-solving check

- according to problem; conducts statistics for system error and random error;
- Single dynamic check operating state of FCC1: in this operating state, FCC1 generates dynamic check problem, and performs dynamic problem-solving check according to problem; conducts statistics for system error and random error;



## 5. HARDWARE COMPOSITION OF EQUIPMENT

FCC1 is composed of display unit, operation unit, electronic casing unit and shock absorber assembly, etc.

The whole system adopts downward wiring. Schematic diagram and size of FCC1 is shown in figure 5-1:

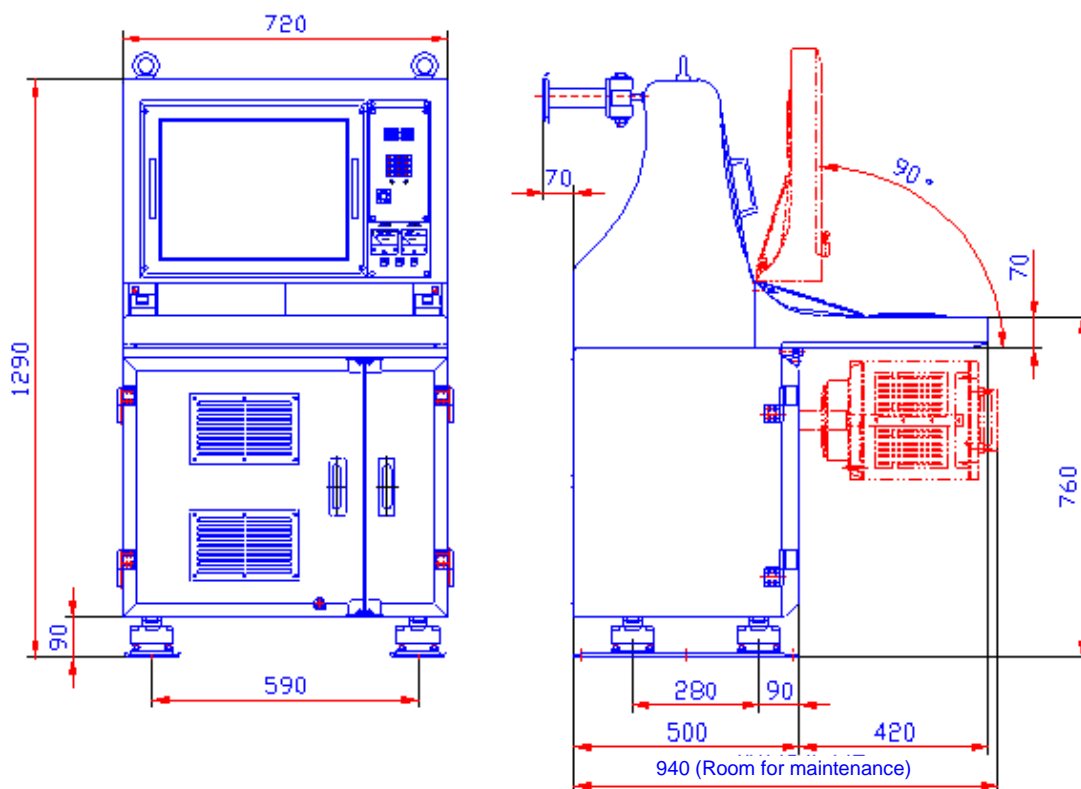


Figure 5-1 Schematic diagram and size of FCC1 (unit: mm)

### 5.1 Display Unit

Display unit displays data, graphics and image, it is above console.

Display unit mainly involves:

- |   |         |
|---|---------|
| a) Structural framework of display unit | 1       |
| b) 20.1" ruggedized LCD                 | 1       |
| c) Support and hinge of display         | 1 group |
| d) Position telephone                   | 1       |
| e) 10-channel deconcentrator            | 1 group |
| f) Fan assembly                         | 1 group |
| g) Socket board on the back             | 1       |
| h) Shielding and ventilated board       | 2       |
| i) Shock absorber assembly on the back  | 1 group |

Schematic diagram of display unit is shown in figure 5-2:

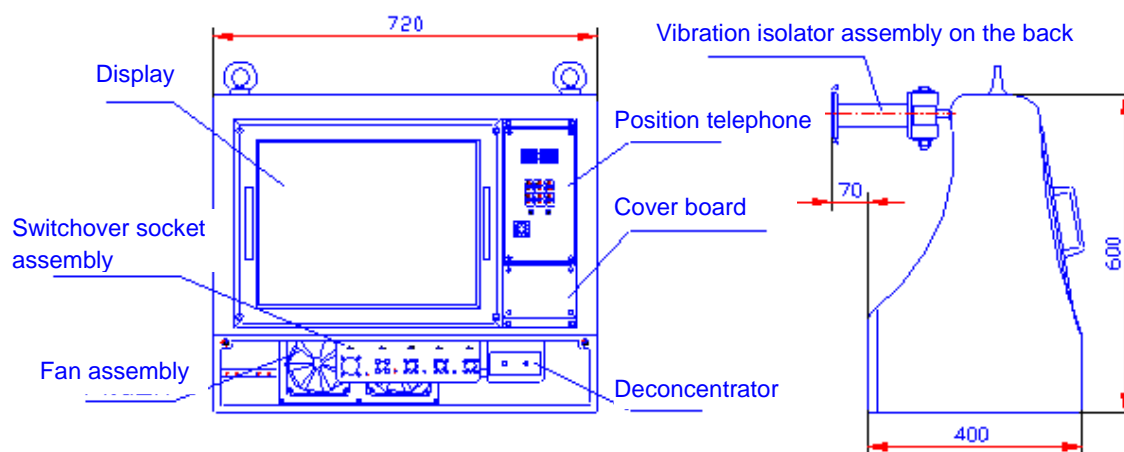


Figure 5-2 Schematic diagram of display unit

There is socket board on display back (signal ground stud and casing ground stud are on the board). Cable connecting with display is connected with host or power supply via this socket board. Arrangement of socket board of display back is shown in figure 5-3. Switchover socket board of operation unit is at the fore part of display framework. Cables connecting with operation unit module and power switch go through this switchover socket board. Arrangement of switchover socket board is shown in figure 5-4.

Socket board of display back is marked as ZB1;

Switchover socket board of operation unit is marked as ZB2.

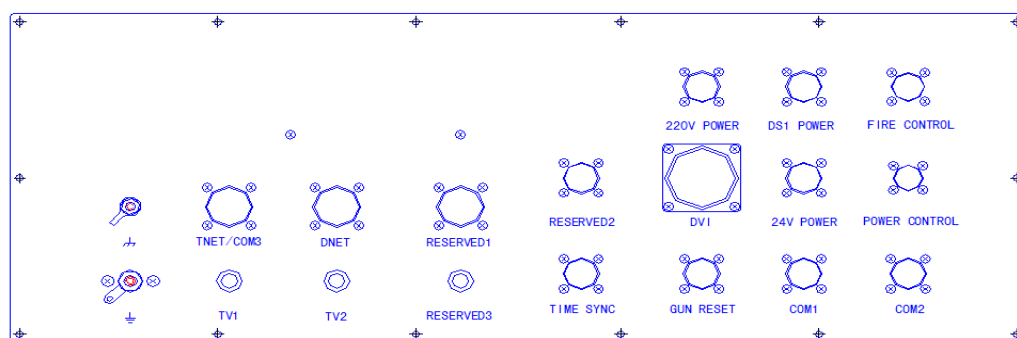


Figure 5-3 Arrangement diagram for socket board of display back (ZB1)

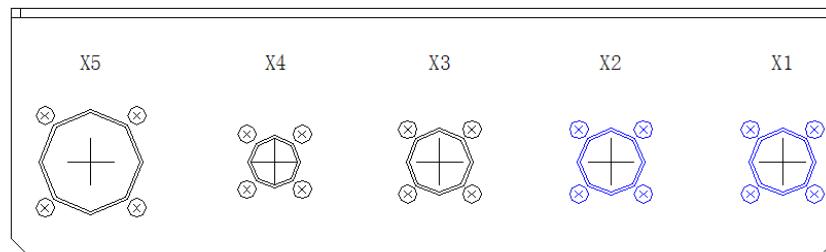


Figure 5-4 Arrangement diagram for switchover socket board (ZB2)

Ruggedized LCD is main display, the module is marked as: DS.

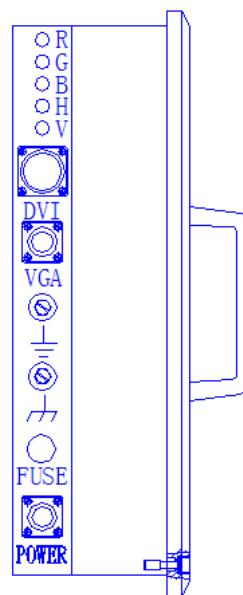


Figure 5-5 DS schematic diagram

DS Main specifications:

- Screen size: 20.1";
- Resolution: 1600x1200;
- Visual angle: vertical 170°, horizontal 170°;
- Synchronizing range: horizontal 31.5KHz~93.75KHz,  
vertical 60Hz~85Hz;
- Interface: DVI, VGA input interface
- Input voltage: AC220V (-10%~+10%), 50Hz (±5%);
- Power: ≤120W.

## 5.2 Operation Unit

Operation unit mainly involves:

a) Structural framework of operation unit	1
b) Programmable touch keyboard	1
c) Track ball	1
d) USB interface extensive module	1
e) Buzzer assembly	1 group
f) Reset switch assembly	1 group
g) Power switch, indicating lamp panel assembly	1 group
h) Cylinder turnover mechanism	2 groups
i) Gun operation module	1

Schematic diagram for operation unit is shown in figure 5-6:

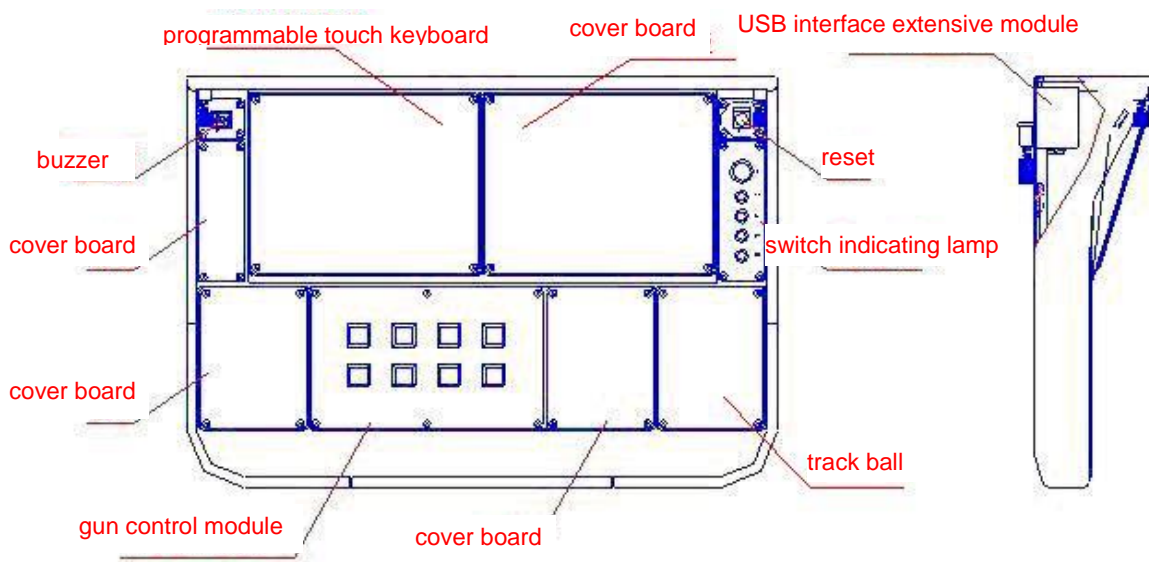


Figure 5-6 Schematic diagram for operation unit

There are heat elimination duct and wiring channel inside operation unit. Operation unit and display unit are connected via hinge. There are two screws below to connect electronic case unit and fasten.

### 5.2.1 Programmable Touch Keyboard

The programmable touch keyboard is software-definable. Sensor adopts 5X6 key arrangement, the grid can be removed.

Programmable touch keyboard is marked as: PTK.

Main specifications:

- Display size: 10.4"
- Resolution: 640 X 480
- External interface: USB

### 5.2.2 Extensive Module of USB Interface

Extensive module of USB interface is used to extend USB interface of 1 channel into USB interface of 6 channels; external equipment such as programmable touch keyboard, track ball perform data exchange with computer via the extensive module of interface; computer sends status instruction via USB interface, extensive module of USB interface drives indicating lamp and buzzer on operation console via I/O interface after receiving and interpreting the instruction; extensive module of USB interface can provide power supply of 5V/10A and 12V/6A for operation modules.

Extensive module of USB interface is marked as: USBEM.

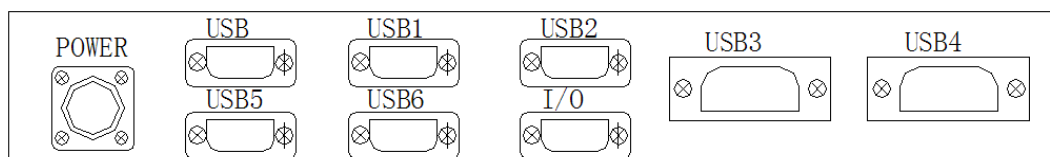


Figure 5-7 Schematic diagram for layout and number of external interface socket of extensive module of USB interface

Main specifications:

- 1 channel of power input interface to provide power supply for the extensive module of USB interface;
- 1 channel of uplink USB interface to connect to the USB interface of computer;
- 6 channels of extensive USB interface to connect to operation module, and provide DC power supply for operation module via the port at the same time;
- I/O interface (6 channels) and DC power output, each channel of I/O has the 100mA current drive capability (low level)

### 5.2.3 Track Ball

Track ball is marked as: TB.

Main specifications:

- Track ball is controlled by thumb, left key, middle key and right key are controlled by forefinger, middle finger and fourth finger respectively, key functional software is definable;
- Interface type: USB

### 5.2.4 Gun Operation Module

The main task of gun operation module is to accomplish some operations and controls for 730B gun.

Gun operation module mark: HPCKMK

The layout of gun operation module is shown as below:

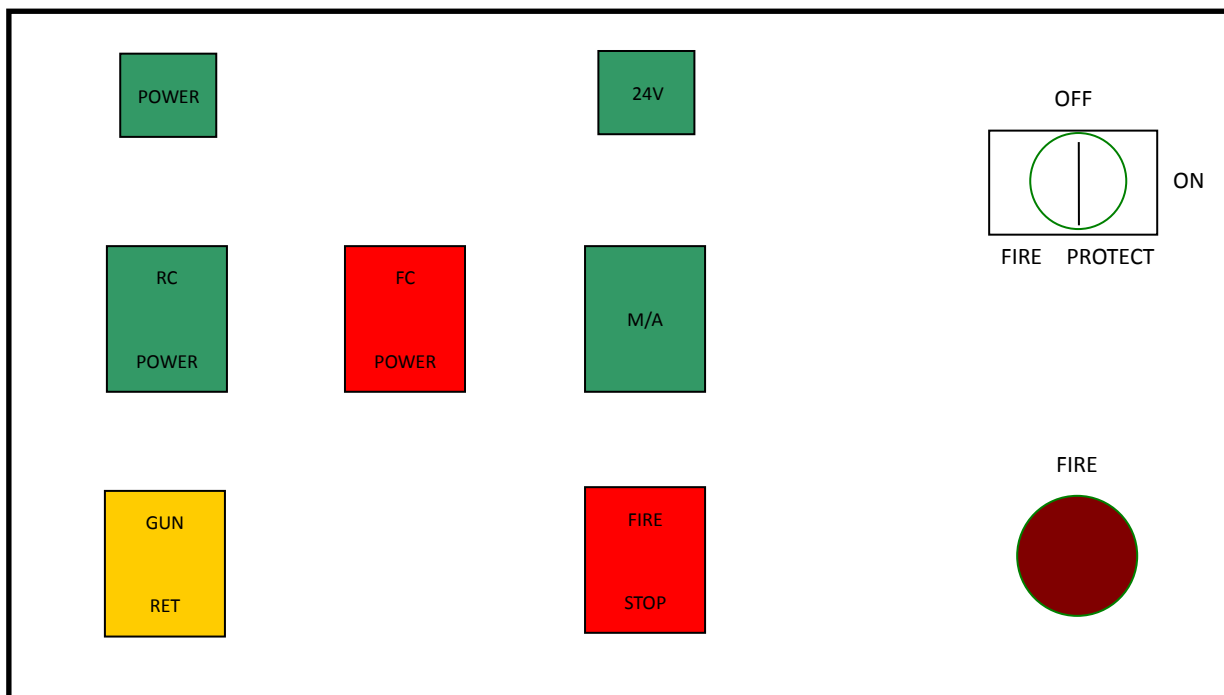


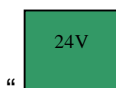
Figure 5-8 Gun operation module schematic diagram

Here:

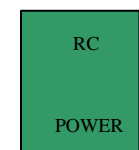


“ ”: Indication light of 730B gun already powered on in remote control mode.

When FCC1 received the signal of 730B gun already powered on in remote control mode, this light is lit;

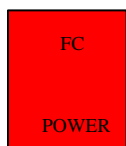


“ ”: Indication light of 24V power supply. When 24V power supply is provided for FCC1, this light is lit;



“ ”Key of 730B gun remote control power-on, non-self lock key. When this key is triggered, FCC1 will send the remote control power-on signal

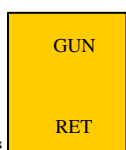
to 730B gun, 730B gun will be supplied with power automatically after received this signal; when FCC1 receive report of the remote control power-on signal from 730B gun, this light is lit;



“ ” Key of 730B gun fire control power-on, self lock key. When this key is pressed down, FCC1 will send the fire control power-on signal to 730B gun, the fire control circuit of 730B gun will be turned on automatically after received this signal. If this key bounced out, the fire control circuit of 730B gun will be cut off automatically;



“ ” Reserve key;

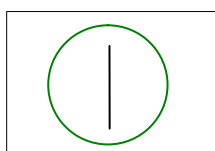


“ ” 730B Gun Reset key, non self lock key. When this key is triggered, FCC1 will send reset signal to 730B gun. The interface computer of gun will reset automatically after receive this signal;



“ ” Cease Fire key, self lock key. When this key is pressed down, FCC1 will cease the firing pulse signal produced by it. If this key bounced out, the generation of the firing pulse signal will be normal;

OFF

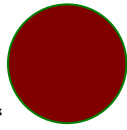


ON

“ FIRE PROTECT

” Fire Protect switch with key. When the key is set to “ON” position, the fire circuit is on. When the key is set to “OFF”, the fire circuit is off. At normal condition, the key should set to “ON” in combat and “OFF” in non-combat;

FIRE



“ ”: Fire key, non self lock key. The key is pressed down at once; the gun will fire once if the firing condition can be met.

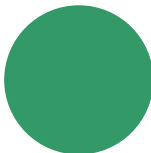
#### 5.2.5 FCC1 Reset Key



RESET

It is on the top right corner of operation unit, non self lock key, and is used to reset FCC1. The key is pressed down once, FCC1 will implement reset operation.

#### 5.2.6 FCC1 Power Supply Key



POWER

It is on the low part of FCC1, non self lock key, and is used to turn on or turn off FCC1. The light is lit, and FCC1 implement turn on operation; if this key bounced out, FCC1 implement turn off operation.



### 5.3 Electronics Box Unit

Electronics box unit adopts wind-forwarding ventilation mode, and the essential components is shown as below:

a) Electronics box unit structural framework	1 piece
b) Left door plank	1 piece
c) Right door plank	1 piece
d) Ruggedized computer	1
e) Accuride three bars of guide rails (stainless steel)	2
f) Ruggedized computer wire hodder assembly	3 groups
g) Bottom shock absorber assembly	2 groups
h) Mask ventilation board	2 pieces

The main configure of electronics box unit is seen in figure 5-9:

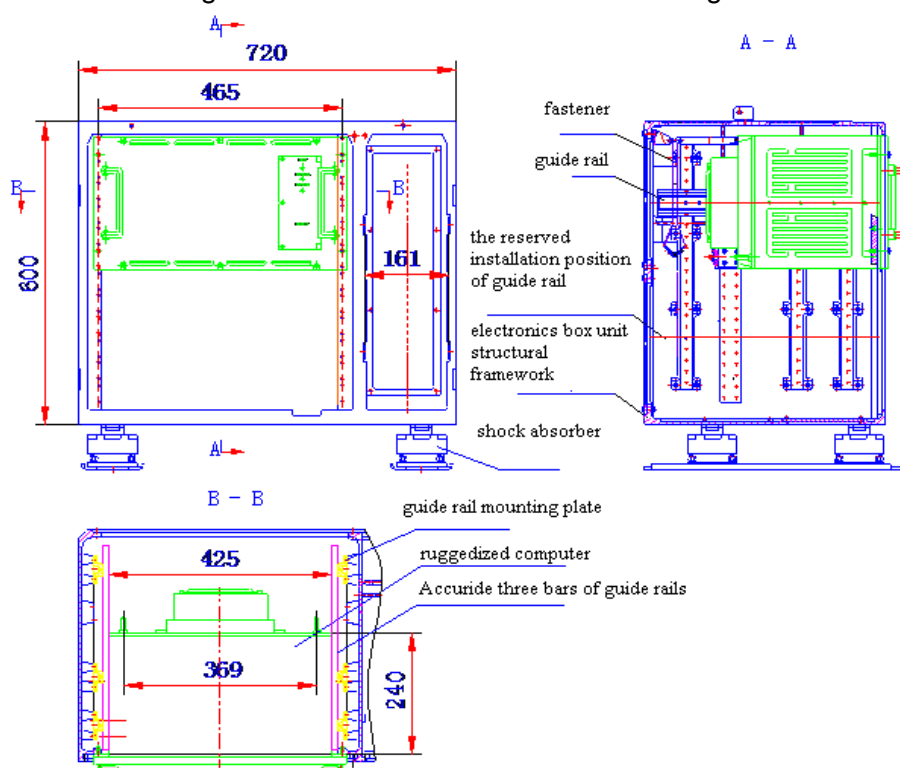


Figure 5-9 Electronics box unit schematic diagram

The electronics box unit is left and right cavity configuration. At the left cavity configuration, there are two pairs of guide rails which are used to install ruggedized computer. Between ruggedized computer and rack, there is fastener. At the right cavity configuration, there is bottom socket mounting plate. The left and right door plank and case framework are connected by detachable hinge. At left door, there are lock, and two pieces of wind fording board and mask ventilation board. The door open angle is more than 90°, once door is pulling up, it can be demounted as soon as possible.

5.3.1 Ruggedized computer

Main part of the electronics box unit is the assembly of ruggedized computer, including case, bottom plate, main processing module, data load module, synthetic display processing module, asynchronous serial port communication module, dual redundancy network module, ruggedized power supply module, fire control interface module, etc. It is the important component of FCC1 and has functions of fire control solution processing, human machine interaction, instruction and control, data communication, data load, etc. The layout of slot position in ruggedized computer assembly is shown in figure 5-10:

The mark of ruggedized computer assembly is: 30-3.

DY2	DY1	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0	Xd
Ruggedized power supply module 2	Ruggedized power supply module 1							Fire control interface module	Asynchronous serial port communication module	Synthetic display processing module	Double redundancy network module	Main processing module	Data load module	LED module
DY-A	DY-A							HKIO	ACM	MFC--SDB	GNET	DCPU	DLRM	LED

Figure 5-10 Ruggedized computer assembly slot layout schematic diagram



Figure 5-11 Ruggedized computer assembly front panel printing (30-3)

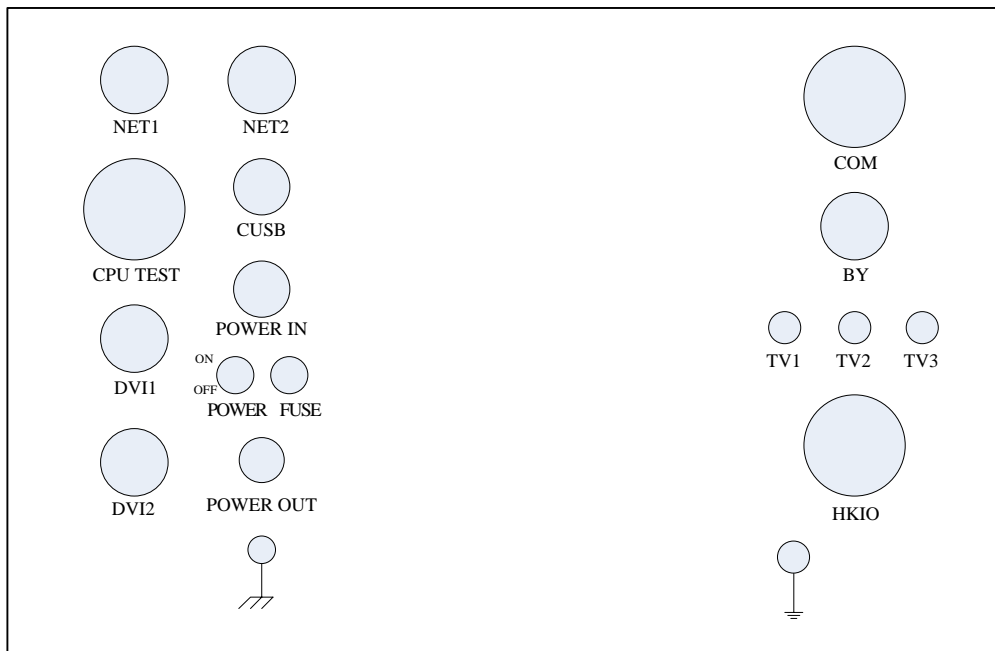


Figure 5-12 Ruggedized computer assembly back panel socket layout schematic diagram

#### 5.3.1.1 Main processing module (DCPU)

The main performance specifications:

- CPU: low voltage Intel L2400 Core dual core processor, main frequency is 1.66GHz:
- Chipset: Intel 945GM/ICH7M, forepart bus is 667MHz:
- Memory: 2G DDRII 667, direct welding mode;
- Display interface: integrated GMA950 graphic controller, it can supply one interface used for DVI digital display, and one DVI/VGA multiplex display interface, the max resolution ratio is up to 2048\*1536 64K Color@65Hz:
- Network interface: supply 4 self-adoption Ethernet interfaces with 10M/100M/1000M bps:
- Other interfaces: supply one IDE interface, two SATA interfaces, onboard one CF interface; 4 USB interfaces which is support to USB start; one standard floppy drive interface; 2 standard RS232 interface; one standard parallel port; one PS/2 keyboard interface; one PS/2 mouse interface;
- Integrated 32bit/33 MHz, 64bit/66MHz PCI to PCI extension bridge;
- Built-in BIST function: supply IPMI interface (compatible IPMI v.1.5).

#### 5.3.1.2 Synthetic display processing module (MFC-SDB)

The main performance specifications:

- Synthetic display: it supports multilayer and multiwindow graph, image video synthetic display; it supports clarity superpose for graph and image video; it supports cursor moving up and down on the screen; it supports 3 channels of video display on the screen at the same time;
- Graph display: the max display resolution ratio is 1600×1200; the display frame frequency is no less than 50Hz; display the color with 24 bit or 32 bit real color; picture element stuffing rate is no less than 500Mpixels/s, texture stuffing rate is no less than 500Mtexels/s, triangle production rate is no less than 50M/s; three dimensional vector construct rate is no less than 10M/s; display memory bandwidth is no less than 3.2GB/s; three dimensional accelerate capability: supports 2D and 3D hardware accelerate;
- TV and infrared display: Select two channels of TV image from multi-path input TV image to process and display with the screen overlay or display in split screen; PAL display resolution is 720×576, NTSC display resolution is 640×480; the display window position and size is adjustable; the brightness, chroma, and saturation is continuing adjust;
- Video insert: dual redundancy digital video network bus insert mode; dual redundancy digital video test bus insert mode; dual redundancy simulative video test bus insert mode; point to point image video input insert mode.

#### 5.3.1.3 Data load module (DLRM)

The main performance specifications:

- Storage media interface: IDE interface which is support to every capacity electron disk;
- Capacity: 32GB;
- USB interface: onboard USB HUB, plate edge supplies 2 test USB interfaces;
- Other test interfaces: plate edge supplies VGA interface and PS2 interface.

#### 5.3.1.4 Asynchronous serial port communication module (ACM)

- The specifications of bus PICMG 2.0R2.1 is compatible, bus voltage is 5V;
- Supply 8 channels of serial ports with asynchronous communication, it can select interface mode with 232/422/485, and also can select insulation.

#### 5.3.1.5 Ruggedized power supply module (DY-A)

The main performance specifications:

- Power supply input: AC 220V input;
- Voltage pulsation scope: +10%, -15%;
- Output requirements: +5V/25A; +3.3V/16A; +12V/10A; -12V/0.8A;
- Ripple coefficient: ≤3%;
- Protection function: it has the function of over voltage protection and over loading protection with current limiting.

## **6. HUMAN-MACHINE INTERACTION**

### **6.1 Interface of Main Display**

The interface of main display includes situation zone, video zone, target designation data zone, navigation data zone, meteorological data zone, FCC1 data zone, TRACKER data zone, BITE data zone, etc. The interface of main display is shown in figure 6-1.

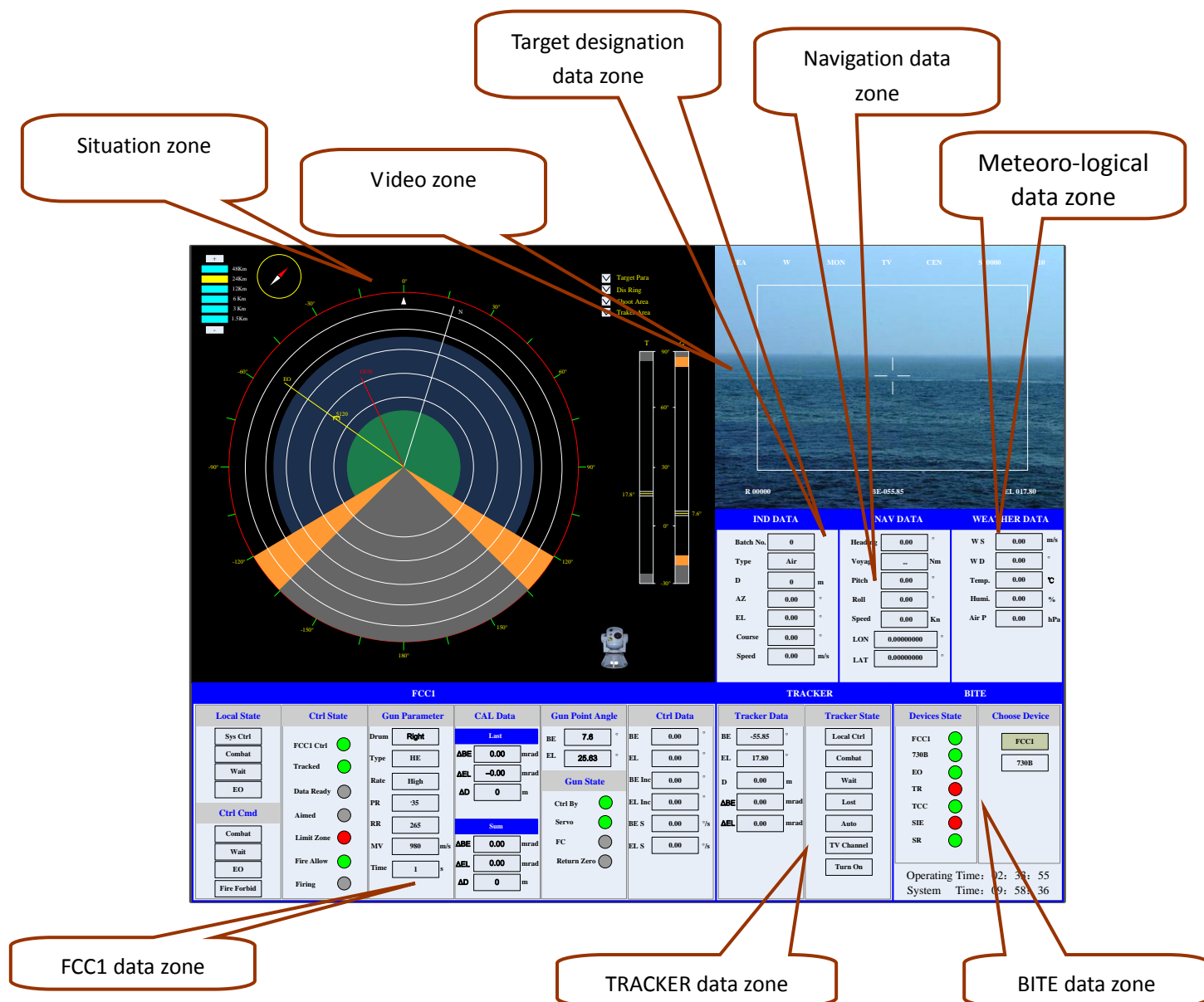


Figure 6-1 Interface of main display

### 6.1.1 Situation Zone

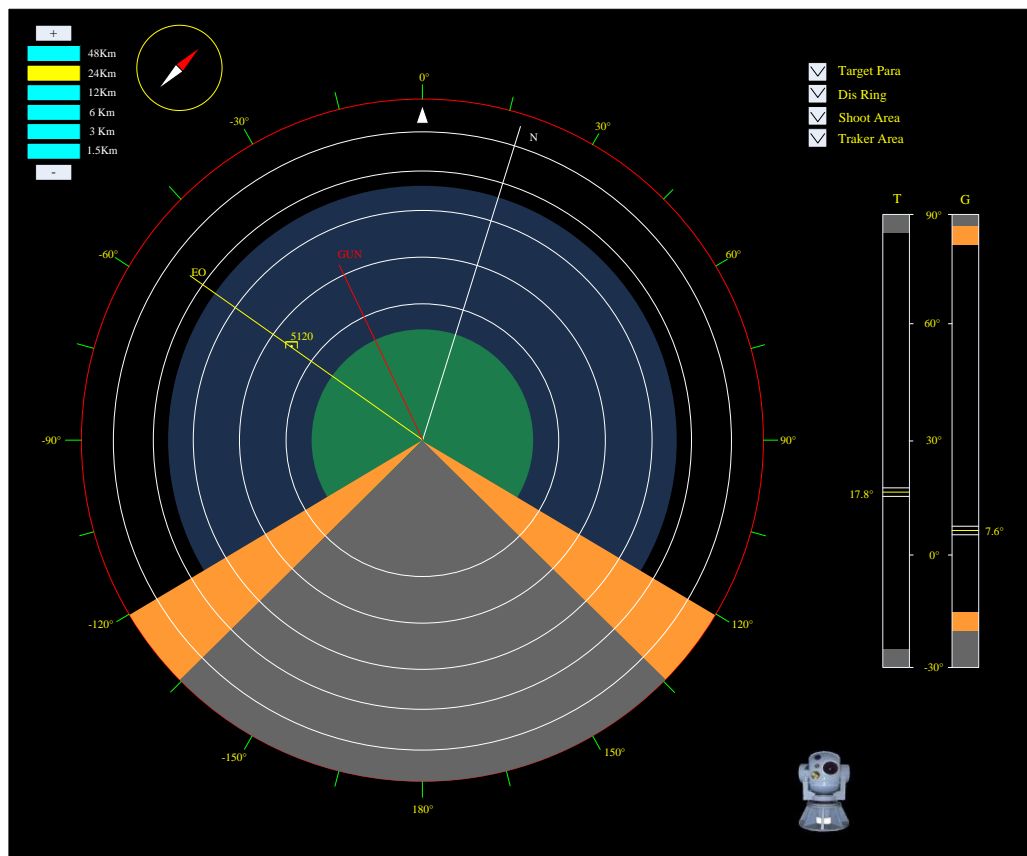


Figure 6-2 The diagram of situation zone

The situation zone is shown in graphics mode to visually display the current situation information, including:

- Azimuth and elevation of tracker;
- Bearing and elevation of gun;
- Bow mark and true north mark;
- Effective firing range of gun;
- Electronic limited range and mechanical limited range of gun;
- Effective operation range of tracker.
- Current used tracking information

In addition to the situation display function, there are two operation zones at top left corner and top right corner of situation map. The operator can use the track ball to achieve different functions.

## 6.1.1.1 Range operation

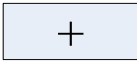


Figure 6-3 Range operation zone


The track ball can be used to click and select different range in the range operation at top left corner in diagram of situation zone (showed in figure 6-3). There are six ranges: 48Km, 24Km, 12Km, 6Km, 3Km and 1.5Km.

The operating method is as follows:



➤ Increasing range

Operator can use the left key of track ball to click  key, and the displayed range will be increased one level than the current range, clicking once, and increasing one level to the maximum of 48 Km .

➤ Reducing range

Operator can use the left key of track ball to click  key, and the displayed range will be reduced one level than the current range, clicking once, and reducing one level to the minimum of 1.5 Km.

➤ Direct selection of range

Operator can use the left key of track ball to click  XX Km, the  XX Km will be set directly.



### 6.1.1.2 Operation of Heading Up/North Up

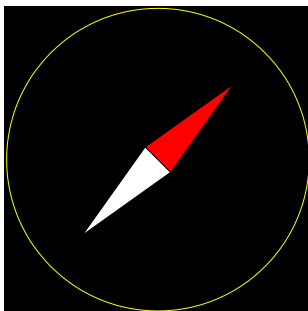


Figure 6-4 Operation zone of Heading Up/North Up

Operator can use the track ball to click the Operation zone of Heading Up/North Up at top left corner in diagram of situation zone (showed in figure 6-4), and set Heading Up or North Up.

Operation method is as follows:

➤ Heading Up

Operator can use the left key of track ball to click “Heading Up/North Up” to



display , which represents “Heading Up”. Click once, switch between Heading Up and North Up once.

➤ North Up

Operator can use the left key of track ball to click “Heading Up/North Up” to



display , which represents “North Up”. Click once, switch between Heading Up and North Up once.

### 6.1.1.3 Graph (parameter) display on/off



Figure 6-5 Graph (parameter) display on/off zone

Operator can use the track ball to click the graph (parameter) display on/off zone at top right corner of the diagram of situation zone (showed in figure 6-5) to set display or hide of graph (parameter).

Operation method is as follows:

#### ➤ Target Parameter

Operator can use the left key of track ball to click ☐ of ☒ **Target Para**.

Click once, switch between ☐ and ☒ once.

☐ represents to hide Target Parameter;

☒ represents to display Target Parameter.

#### ➤ Distance Ring

Operator can use the left key of track ball to click ☐ of ☒ **Dis Ring**. Click

once, switch between ☐ and ☒ once.

☐ represents to hide Distance Ring;

☒ represents to display Distance Ring.

#### ➤ Shoot Area

Operator can use the left key of track ball to click ☐ of ☒ **Shoot Area**.

Click once, switch between ☐ and ☒ once.

☐ represents to hide Shoot Area;

☒ represents to display Shoot Area.

➤ Tracer Area

Operator can use the left key of track ball to click ☒ of ☒ **Traker Area**.

Click once, switch between ☐ and ☒ once.

☐ represents to hide Tracer Area;

☒ represents to display Tracer Area.

### 6.1.2 Video

TV image or Infrared image from EO can be displayed in video.

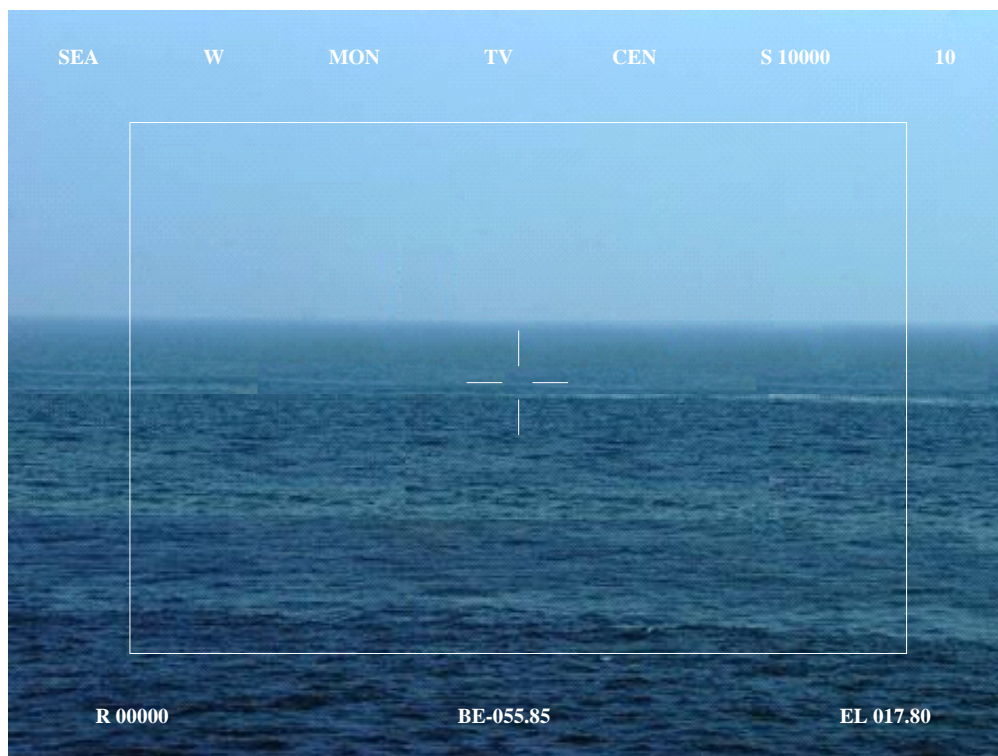


Figure 6-6 The diagram of video

## 6.1.3 Target Indication

IND DATA	
Batch No.	0
Type	Air
D	0 m
AZ	0.00 °
EL	0.00 °
Course	0.00 °
Speed	0.00 m/s

Figure 6-7 The diagram of target parameter

There are target batch number, type, range, azimuth, elevation, course and speed in the target parameter.

Here:

“Batch No. 0” represents batch number of target;

“Type Air” represents target type, including air target, surface target and shore target;

“D 0 m” represents target distance, and unit is meter;

“AZ 0.00 °” represents target azimuth, and unit is degree;

“EL 0.00 °” represents target elevation, and unit is degree;

“Course 0.00 °” represents target course, and unit is degree;

“Speed 0.00 m/s” represents target speed, and unit is meter/second.

## 6.1.4 Navigation Data

NAV DATA		
Heading	0.00	°
Voyage	--	Nm
Pitch	0.00	°
Roll	0.00	°
Speed	0.00	Kn
LON	0.00000000	°
LAT	0.00000000	°

Figure 6-8 The diagram of navigation data

There are heading, voyage, pitch, roll, speed, longitude and latitude in the navigation parameter.

Here:

- “ Heading 0.00 ° ” represents heading;
- “ Voyage -- Nm ” represents voyage, and unit is nautical mile;
- “ Pitch 0.00 ° ” represents pitch, and unit is degree;
- “ Roll 0.00 ° ” represents roll, and unit is degree;
- “ Speed 0.00 Kn ” represents speed, and unit is knot;
- “ LON 0.00000000 ° ” represents longitude, and unit is degree;
- “ LAT 0.00000000 ° ” Represents latitude and unit is degree.

## 6.1.5 Weather Data

WEATHER DATA		
W S	0.00	m/s
W D	0.00	°
Temp.	0.00	°C
Humi.	0.00	%
Air P	0.00	hPa

Figure 6-9 The diagram of weather data

There are wind speed, wind direction, temperature, humidity and air pressure in the weather data.

Here:

W S    0.00    m/s    represents wind speed, and unit is m/s;

W D    0.00    °    represents wind direction, and unit is degree;

Temp.    0.00    °C    represents temperature, and unit is degree centigrade;

Humi.    0.00    %    represents humidity, and unit is percentage;

“ Air P    0.00    hPa ” represents air pressure, and unit is hPa.

## 6.1.6 FCC1 Data

FCC1					
Local State	Ctrl State	Gun Parameter	CAL Data	Gun Point Angle	Ctrl Data
<div>Sys Ctrl</div> <div>Combat</div> <div>Wait</div> <div>EO</div>	<div>FCC1 Ctrl </div> <div>Tracked </div> <div>Data Ready </div> <div>Aimed </div> <div>Limit Zone </div> <div>Fire Allow </div> <div>Firing </div>	<div>Drum <div>Right</div></div> <div>Type <div>HE</div></div> <div>Rate <div>High</div></div> <div>PR <div>:35</div></div> <div>RR <div>265</div></div> <div>MV <div>910.00</div> m/s</div> <div>Time <div>1.00</div> s</div>	<div>Last</div> <div><math>\Delta</math>BE <div>0.00</div> mrad</div> <div><math>\Delta</math>EL <div>0.00</div> mrad</div> <div><math>\Delta</math>D <div>0</div> m</div> <div>Sum</div> <div><math>\Delta</math>BE <div>0.00</div> mrad</div> <div><math>\Delta</math>EL <div>0.00</div> mrad</div> <div><math>\Delta</math>D <div>0</div> m</div>	<div>BE <div>7.62</div> °</div> <div>EL <div>25.63</div> °</div> <div>Gun State</div> <div>Ctrl By </div> <div>Servo </div> <div>FC </div> <div>Return Zero </div>	<div>BE <div>0.00</div> °</div> <div>EL <div>0.00</div> °</div> <div>BE Inc <div>0.00</div> °</div> <div>EL Inc <div>0.00</div> °</div> <div>BE S <div>0.00</div> °/s</div> <div>EL S <div>0.00</div> °/s</div>

Figure 6-10 The diagram of FCC1 data

The following parameters will be displayed in FCC1 data:

- Local state;
- System control state;
- Control command;
- Gun firing parameter;
- Calibration data;
- Gun point angle;
- Gun state;
- Control data.

### 6.1.6.1 Local state

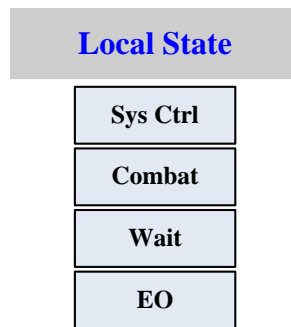


Figure 6-11 The diagram of local state

There are four display dialogues in the diagram of local state to display current state of FCC1, including:

**The first display dialogue:** It represents control mode of FCC1: system control or local control.




- Sys Ctrl FCC1 is system control mode at present.
- Local Ctrl FCC1 is local control mode at present.


**The second display dialogue:** It represents operating mode of FCC1: combat, training or check.


- Combat or Train FCC1 is system control mode at present.
  - Combat is to perform “combat” operating mode controlled by the system control mode.
  - Train is to perform “training ” operating mode controlled by the system control mode.
- Combat or Check FCC1 is local control mode at present.
  - Combat is to perform “combat” operating mode controlled by the local control mode.
  - Check is to perform “check” operating mode controlled by the local control mode.




**The third display dialogue:** It represents operation state of FCC1 at present: wait, target indication, autonomous, direct attack, virtual fire or check.

➤ ,  or  FCC1 is system control mode at present.






 is to perform “wait ” operating mode controlled by the system control mode.


 is to perform “target indication” operating mode controlled by the system control mode.


 is to perform “direct attack” operating mode controlled by the system control mode.


➤ When FCC1 is local control mode, the display dialogue should be:


In “**combat**” operating mode:


, , , , .

 is to perform “wait” operating mode controlled by the local control mode.

 is to perform “target indication” operating mode controlled by the local control mode.

 is to perform “autonomous” operating mode controlled by the local control mode.

 is to perform “direct attack” operating mode controlled by the local control mode.

 is to perform “virtual fire” operating mode controlled by the local control mode.

In “**check**” operating mode:

**EO FCS-S** , **EO FCS-D** , **EO Semi-S** , **EO Semi-D** , **FCC1&Gun** ,  
**Gun Static** , **Gun Speed** , **Gun Sin** , **FCC1-S** or **FCC1-D**

**EO FCS-S** is to perform “EO FCS-S check ”operating mode controlled by local control mode.

**EO FCS-D** is to perform “EO FCS-D check ”operating mode controlled by local control mode.

**EO Semi-S** is to perform “EO semi-system check ”operating mode controlled by local control mode.

**EO Semi-D** is to perform “EO semi-system dynamic check ”operating mode controlled by local control mode.

**FCC1&Gun** is to perform “joint check of FCCI and 730B gun ”operating mode controlled by local control mode.

**Gun Static** is to perform “check to control gun in jumping mode ”operating mode controlled by local control mode.

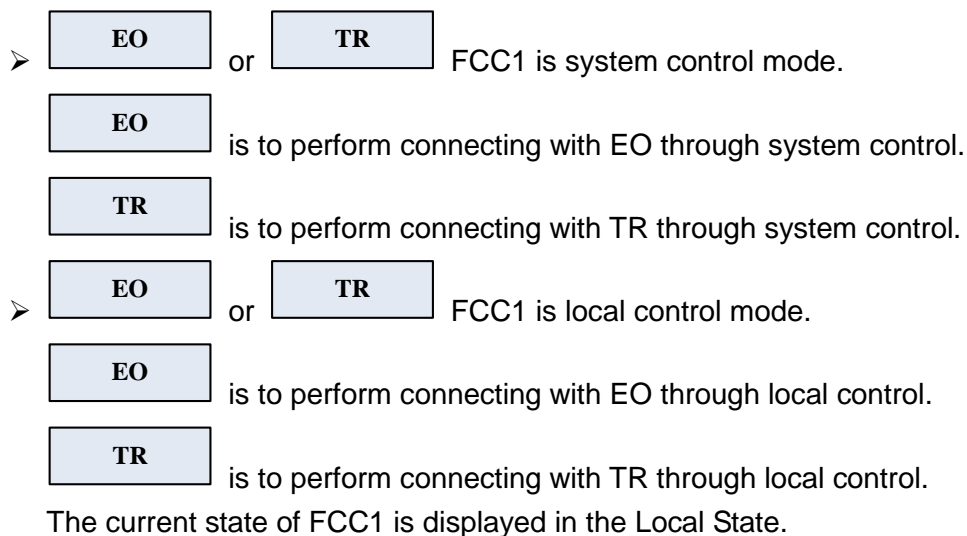
**Gun Speed** is to perform “check to Control gun in constant velocity mode” operating mode controlled by local control mode.

**Gun Sin** is to perform “check to control gun in sine mode ”operating mode controlled by local control mode.

**FCC1-S** is to perform “only FCC1 static check” operating mode controlled by local control mode.

**FCC1-D** is to perform “only FCC1 dynamic check ”operating mode controlled by local control mode.

**The fourth display dialogue:** It represents FCC1 connecting with EO or FCC1 connecting with TR, that is the tracking information of target from EO or TR.



#### 6.1.6.2 System control command

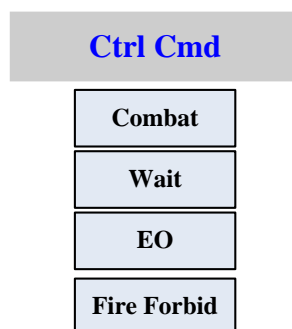
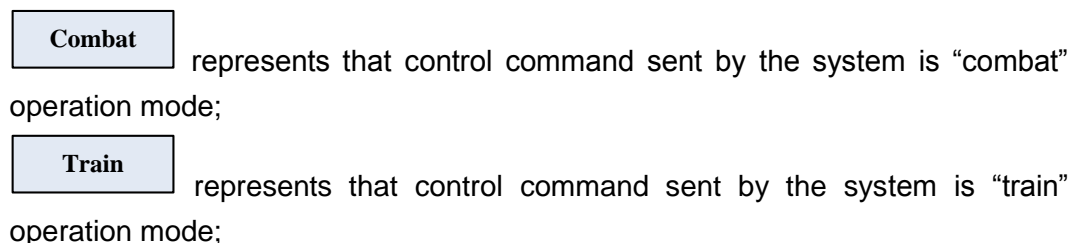


Figure 6-12 The diagram of system control command

The control commands from TCC are displayed in the system control command page. There are four display dialogues, including:

**The first display dialogue:** It represents control command mode sent by TCC at present: “combat” operation mode or “check” operation mode.



**The second display dialogue:** It represents control command mode sent by TCC at present: “wait” operation mode, “target indication” operation mode or “direct attack” operation mode.

**Wait**

represents that control command sent by the system is “wait” operation mode;

**IND**

represents that control command sent by the system is “target indication” operation mode;

**D. Attack**

represents that control command sent by the system is “direct attack” operation mode;

**The third display dialogue:** It represents control command mode sent by TCC: connecting with EO or connecting with TR.

**EO**

represents that control command sent by the system is to connect with EO;

**TR**

represents that control command sent by the system is to connect with TR.

**The fourth display dialogue:** It represents control command mode sent by TCC: fire allow or fire forbid.

**Fire Allow**

represents that control command sent by the system is fire allow;

**Fire Forbid**

represents that control command sent by the system is fire forbid.

## 6.1.6.3 Control state



Figure 6-13 The diagram of control state

Various parameters of control state are displayed in the diagram of control state. Here:

“FCC1 Ctrl ” represents the situation of FCC1 controlling 730B gun: the green means “control available”, and grey means “control unavailable”.

“Tracked ” represents the situation of tracker: the green means “tracked”, and grey means “tracking unavailable”.

Data Ready represents the situation of fire control data: the green means “Data Ready”, and the grey means “Data unready”.

Aimed represents the situation of gun aiming: the green means “Aimed”, and the grey means “Aiming unavailable”;

Limit Zone represent the situation of gun: the green means “beyond limited zone”, and red means “in limited zone”.

Fire Allow represents the situation of fire allow: the green means “fire allow”, the red means “fire forbid”.

Firing represents the situation of firing: the red means “firing”, and the grey means “no firing”.

## 6.1.6.4 Gun firing parameter

Gun Parameter	
Drum	Right
Type	HE
Rate	High
PR	35
RR	265
MV	910.00 m/s
Time	1.00 s

Figure 6-14 The diagram of gun firing parameter

Some gun firing parameters are displayed in the diagram of gun parameter.

Here:

**Drum** **Right**

represent the current drum being used: Right means the right drum being used, and Left drum means the left drum being used.

**Type** **HE**

represents type of projectile: HE means high explosive projectile.

**Rate** **High**

represents fire rate: High means high fire rate, Middle means middle fire rate, and Low means low fire rate. when it displays as “— —”, which represents no fire rate

**PR** **35**

represents fired rounds: the number of projectiles are fired in one finished firing operation.

**RR** **265**

represents ammunition left: the number of residual projectiles in the drum being used.

**MV** **910.00** m/s

represents the projectile muzzle velocity: the muzzle velocity of HE is 910m/s.

**Time** **1.00** s

represents duration of continuous fire: the duration of continuous fire has been set, and unit is second.

6.1.6.5 Calibration data

CAL Data		
Last		
$\Delta BE$	0.00	mrاد
$\Delta EL$	0.00	mrاد
$\Delta D$	0	m
Sum		
$\Delta BE$	0.00	mrاد
$\Delta EL$	0.00	mrاد
$\Delta D$	0	m

Figure 6-15 The diagram of calibration data

The last firing calibration data and sum of firing calibration data are displayed in the diagram of calibration data.

- The last firing calibration data

Last		
$\Delta BE$	0.00	mrاد
$\Delta EL$	0.00	mrاد
$\Delta D$	0	m

Figure 6-16 The diagram of last firing calibration data

Here:

- $\Delta BE$  0.00 mrاد
- represents bearing correction, and unit is milliradian;
- $\Delta EL$  0.00 mrاد
- represents elevation correction, and unit is milliradian;
- $\Delta D$  0 m
- represents distance correction, and unit is meter.

➤ Sum of firing calibration data

Sum		
$\Delta BE$	0.00	mrad
$\Delta EL$	0.00	mrad
$\Delta D$	0	m

Figure 6-17 Sum of firing calibration data

Here:

$\Delta BE$  0.00 mrad

represents sum of bearing correction, and unit is milliradian;

$\Delta EL$  0.00 mrad

represents sum of elevation correction, and unit is milliradian;

$\Delta D$  0 m

represents sum of distance correction, and unit is meter.

#### 6.1.6.6 Gun point angle

Gun Point Angle		
BE	7.62	°
EL	25.63	°

Figure 6-18 The diagram of gun point angle

The angles of current position are displayed in the diagram of gun point angle.

Here:

BE 7.62 °

represents gun bearing, and unit is degree;

EL 25.63 °

represents gun elevation, and unit is degree.

Note: Do not communicate with gun or gun turns off, so it displays as

--



## 6.1.6.7 Gun state

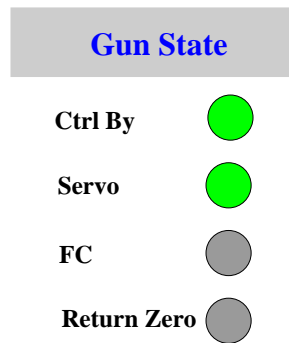


Figure 6-19 The diagram of gun state

The current state information of gun is displayed in the diagram of gun state.  
Here:

**Ctrl By** 

represents the situation of FCC1 controlling gun: the green means "control available", and grey means "control unavailable"

**Servo** 

represents servo power-on situation of gun: the green means "servo power-on ", and grey means "servo power-off".

**FC** 

represents power-on situation of fire control: the green means "power on of fire control", and grey means "power off of fire control".

**Return Zero** 

represents return zero situation of gun: the green means "return zero", and grey means "not return zero".

Note: Do not communicate with gun or gun turns off, so all indicators are grey.

6.1.6.8 Gun control data

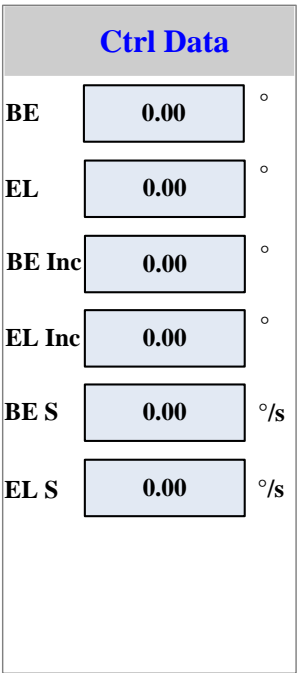


Figure 6-20 The diagram of gun control data

The fire control data are displayed in the diagram of gun control data.  
Here:

- BE** 0.00 ° represents bearing of gun , and unit is degree;
- EL** 0.00 ° represents elevation of gun , and unit is degree;
- BE Inc** 0.00 ° represents bearing increment of gun, and unit is degree;
- EL Inc** 0.00 ° represents elevation increment of gun, and unit is degree;
- BE S** 0.00 °/s represents bearing angular velocity of gun, and unit is degree/second;
- EL S** 0.00 °/s represents elevation angular velocity of gun, and unit is degree/second;

6.1.7 TRACKER data

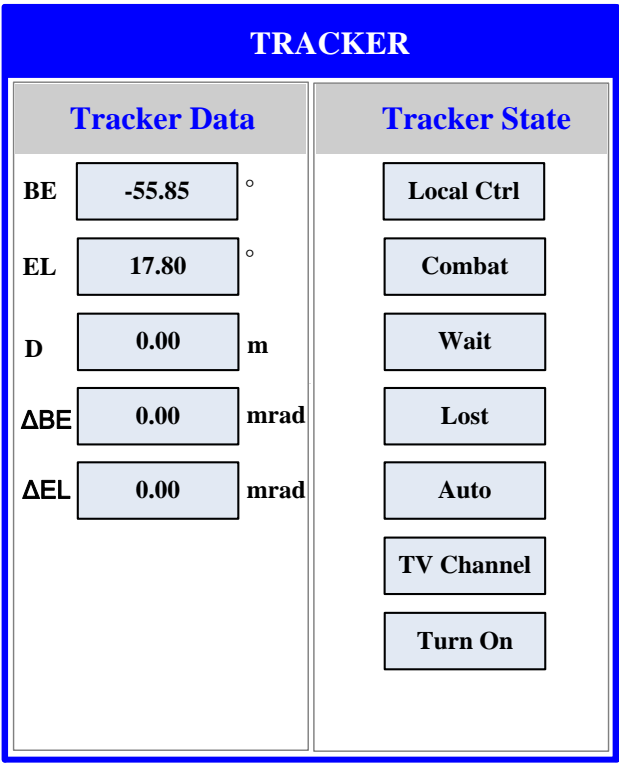


Figure 6-21 The diagram of TRACKER data

Contents displayed in the diagram of TRACKER data include:

- Tracker data;
- Tracker state.

**Note:** Do not communicate with the relevant tracker or the tracker turns off,

so  will be displayed in the diagram of TRACKER data.

## 6.1.7.1 Tracker data

Tracker Data		
BE	-55.85	°
EL	17.80	°
D	0.00	m
$\Delta$ BE	0.00	mrاد
$\Delta$ EL	0.00	mrاد

Figure 6-22 The diagram of tracker data

Here:

“ BE  ° ” represents bearing, and unit is degree;

“ EL  ° ” represents elevation, and unit is degree;

“ D  m ” represents distance, and unit is meter;

“  $\Delta$ BE  mrاد ” represents error angle in bearing tracking, and unit is milliradian;

“  $\Delta$ EL  mrاد ” represents error angle in elevation tracking, and unit is milliradian;

## 6.1.7.2 Tracker state

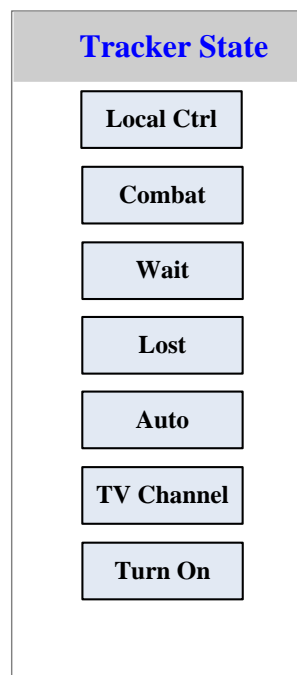


Figure 6-23 The diagram of tracker state

The current operation state of tracker is displayed in the diagram of tracker state. There are seven display dialogues used for EO or TR, including:

**I EO**

**The first display dialogue:** It represents control mode of EO: system control, FCC1 control, local control or uncontrolled.

- |                   |  |
|-------------------|--|
| <b>Sys Ctrl</b>   | represents that EO is controlled by the system at present; |
| <b>FCC1 Ctrl</b>  | represents that EO is controlled by FCC1 at present;       |
| <b>Local Ctrl</b> | represents that EO is controlled by the local at present;  |
| <b>None</b>       | represents that EO is uncontrolled at present.             |

**The second display dialogue:** It represents operation mode of EO: combat, train or check.

- When EO is controlled by the system, it shows Combat or Train.  
Combat represents that EO is combat operation mode in system control mode at present;  
Train represents that EO is train operation mode in system control mode at present;
- When EO is controlled by the FCC1, it shows Combat or Check.  
Combat represents that EO is combat operation mode in FCC1 control mode at present;  
Check represents that EO is check operation mode in FCC1 control mode at present
- When EO is controlled by the local, it shows Combat or Check.  
Combat represents that EO is combat operation mode in local control mode at present;  
Check represents that EO is check operation mode in local control mode at present;

**The third display dialogue:** It represents operation mode of EO at present: wait, target indication, autonomous, direct attack, virtual fire or accuracy check.

- When EO is controlled by the system, it shows Wait, IND or D. Attack.  
Wait represents that EO is wait operation mode in system control mode at present;  
IND represents that EO is target indication operation mode in system control mode at present;  
D. Attack represents that EO is direct attack operation mode in system control mode at present;
- When EO is controlled by the FCC1, it shows Wait, IND, Autonomous, D. Attack, V. Fire or

**Checking****Wait**

represents that EO is wait operation mode in FCC1 control mode at present;

**IND**

represents that EO is target indication operation mode in FCC1 control mode at present;

**Autonomous**

represents that EO is autonomous operation mode in FCC1 control mode at present;

**D. Attack**

represents that EO is direct attack operation mode in FCC1 control mode at present;

**V. Fire**

represents that EO is virtual fire operation mode in FCC1 control

**Checking**

represents that EO is accuracy check operation mode in FCC1 control mode at present;

**Autonomous**

➤ When EO is controlled by the local, it shows

**Autonomous**

represents that EO is autonomous operation mode in local control mode at present;

**The fourth display dialogue:** It represents tracking mode of EO at present: target lost, angle tracking, memory tracking or searching.

**Lost**

represents target lost;

**Tracking**

represents angle tracking;

**M. Tracking**

represents memory tracking;

**Searching**

represents searching.

**The fifth display dialogue:** It represents operation mode of EO at present: automatic mode or manual mode.

**Auto**

represents that EO is in automatic mode;

**Manual**

represents that EO is in manual mode.

**The sixth display dialogue:** It represents tracking channel used by EO: TV channel or IR channel.

- TV Channel** represents that TV channel of EO is used as tracking channel;
- IR Channel** represents that IR channel of EO is used as tracking channel.

**The seventh display dialogue:** It represents turn-on or turn-off of EO.

- Turn On** represents that EO turns on;
- — — —** represents that EO turns off.

## II TR

**The first display dialogue:** It represents control mode of TR: system control, FCC2 control or local control.

- Sys Ctrl** TR is system control mode at present.
- FCC2 Ctrl** TR is FCC2 control mode at present.
- Local Ctrl** TR is local mode at present.
- None** There is no control source at present

**The second display dialogue:** It represents operation mode of TR: combat, train or check.

- When TR is system control mode, the content of display dialogue is **Combat** or **Train**.

- Combat** TR is in combat mode of system control mode at present;
- Train** TR is in train mode of system control mode at present;

- When TR is FCC2 mode, the content of display dialogue is **Combat** or **Check**.

- Combat** TR is in combat mode of FCC2 control mode at present;
- Check** TR is in check mode of FCC2 control mode at present;



- When TR is local control mode, the content of display dialogue is

**Combat**

or **Check**.

**Combat**

TR is in combat mode of local control mode at present;

**Check**

TR is in check mode of local control mode at present.

**The third display dialogue:** It represents operation state of TR: wait, target designation, autonomous operation, direct attack and virtual fire or accuracy check.

- When TR is system control mode, the content of display dialogue

is **Wait**, **IND** or **D. Attack**.

**Wait**

TR is in standby operation of system control mode at present;

**IND**

TR is in target designation operation of system control mode at present;

**D. Attack**

TR is in direct attack operation of system control mode at present;

- When TR is FCC2 control mode, the content of display dialogue

is **Wait**, **IND**, **Autonomous**, **D. Attack**, **V. Fire**

or **Checking**.

**Wait**

TR is in standby operation of FCC2 control mode at present;

**IND**

TR is in target designation state of FCC2 control mode at present;

**Autonomous**

TR is in autonomous operation of FCC2 control mode at present;

**D. Attack**

TR is in direct attack operation of FCC2 control mode at present;

**V. Fire**

TR is in virtual fire operation of FCC2 control mode at present;

**Checking**

TR is in accuracy check operation of FCC2 control mode at present;

- When TR is local control mode, the content of display dialogue is

**Autonomous**

**Autonomous**

TR is in autonomous operation of local control mode at present;

**The fourth display dialogue:** It represents tracking state of TR: tracked or searching.

Tracking

Tracked;

Searching

Searching;

**The fifth display dialogue:** It represents TR is operating in radar channel, TV channel or radar/TV multiple channels.

TR Channel

TR is operating in radar channel at present;

TV Channel

TR is operating in TV channel at present;

Multiple

TR is operating in radar/TV multiple channels at present;

**The sixth display dialogue:** It represents laser is turned on or turned off.

LS Turn Off

Laser is turned off;

LS Turn On

Laser is turned on.

**The seventh display dialogue:** It represents radar transmitter is turned on or turned off.

Trans Off

Radar transmitter is turned off;

Trans On

Radar transmitter is turned on.

### 6.1.8 BITE data

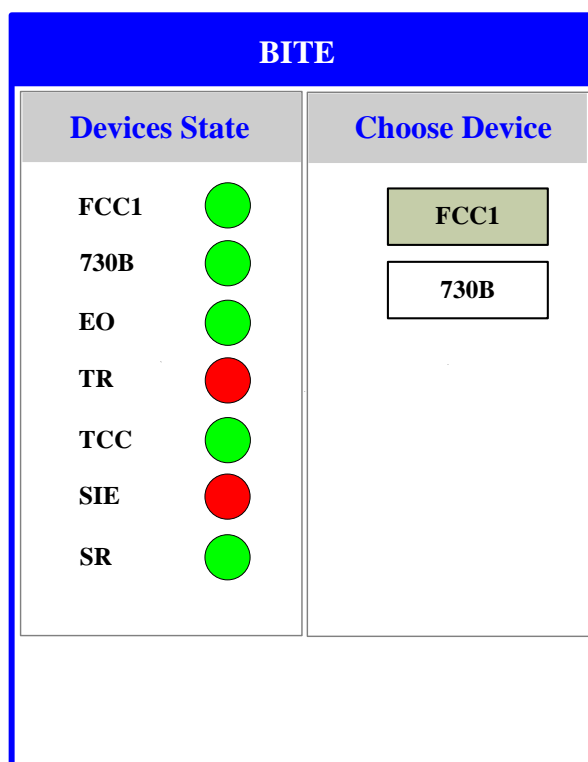


Figure 6-24 the diagram of BITE data

Failures of FCC1 and other equipment communicating with FCC1 are displayed in the diagram of BITE data. The detailed failure tables of FCC1 and 730B gun also can be displayed in the diagram of BITE data.

#### 6.1.8.1 Failure indication

Failures of FCC1 and other equipment communicating with FCC1 are displayed in the left schematic diagram of BITE data by a row of indicators.

**FCC1** ●: It represents fault state of FCC1.

When the equipment fault state indicator is green, the equipment is normal;  
When the equipment fault state indicator is red, the equipment is fault;

**730B** ●: It represents fault state of 730B gun.

When the equipment fault state indicator is green, the equipment is normal;  
When the equipment fault state indicator is red, the equipment is fault;  
When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

**EO** ●: It represents fault state of EO.

When the equipment fault state indicator is green, the equipment is normal;  
When the equipment fault state indicator is red, the equipment is fault;  
When the equipment fault state indicator is light, the equipment is normal;

When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

**TR** : It represents fault state of TR.

When the equipment fault state indicator is green, the equipment is normal;

When the equipment fault state indicator is red, the equipment is fault;

When the equipment fault state indicator is light, the equipment is normal;

When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

**TCC** : It represents fault state of TCC.

When the equipment fault state indicator is green, the equipment is normal;

When the equipment fault state indicator is red, the equipment is fault;

When the equipment fault state indicator is light, the equipment is normal;

When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

**SIE** : It represents fault state of SIE.

When the equipment fault state indicator is green, the equipment is normal;

When the equipment fault state indicator is red, the equipment is fault;

When the equipment fault state indicator is light, the equipment is normal;

When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

**SR** : It represents fault state of SR.

When the equipment fault state indicator is green, the equipment is normal;


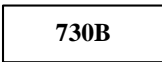
When the equipment fault state indicator is red, the equipment is fault;

When the equipment fault state indicator is light, the equipment is normal;

When the equipment fault state indicator is gray, FCC1 is not communicating with the equipment;

#### 6.1.8.2 Detailed fault list display

There are detailed FCC1 and 730B fault lists in the right column of BITE parameter zone.

Operator can use the track ball to select  area or  area, then the detailed fault list of FCC1 or 730B gun will be displayed in the main display, and the assembly fault or the module fault can be detected.

## I FCC1 equipment failure list

Operator can use the track ball to select FCC1 area and click the left key of track ball, and then the detailed fault list of FCC1 equipment will be displayed on the main display screen, as shown in figure 6-25.







FCC1 Fault List	
HKIO Module	
Net Receive	
Net Send	
Touch Screen	
Synchronization	


Figure 6-25 FCC1 equipment fault list

Here:

**HKIO Module** : It represent whether the fire control interface module is normal or not.


When the indicator is green, fire control interface module is normal;

When the indicator is red, fire control interface module is fault.

**Net Receive** : It represent whether the network receive function is normal or not.

When the indicator is green, network receive function is normal;

When the indicator is red, network receive function is fault.

**Net Send** : It represent whether the network transmit function is normal or not.


When the indicator is green, network transmit function is normal;

When the indicator is red, network transmit function is fault.

**Touch Screen** : It represent whether the touch screen is normal or not.

When the indicator is green, touch screen is normal;

When the indicator is red, touch screen is fault.

**Synchronization** : It represents whether the time synchronization signal is normal or not.

When the indicator is green, time synchronization signal is normal;

When the indicator is red, time synchronization signal is fault.

Note: FCC1 can both receive external time synchronization signal as well as generate inner time synchronization signal. External time synchronization signal is used when FCC1 can receive it from outside. If the external time synchronization signal can not be received by FCC1, inner time synchronization signal will be generated and used. By this time, a prompt of “Inner Syn” (as shown in figure 6-26) will be displayed in BITE data area to represent for the external time synchronization signal can not be received, inner time synchronization signal is used by FCC1 at present.

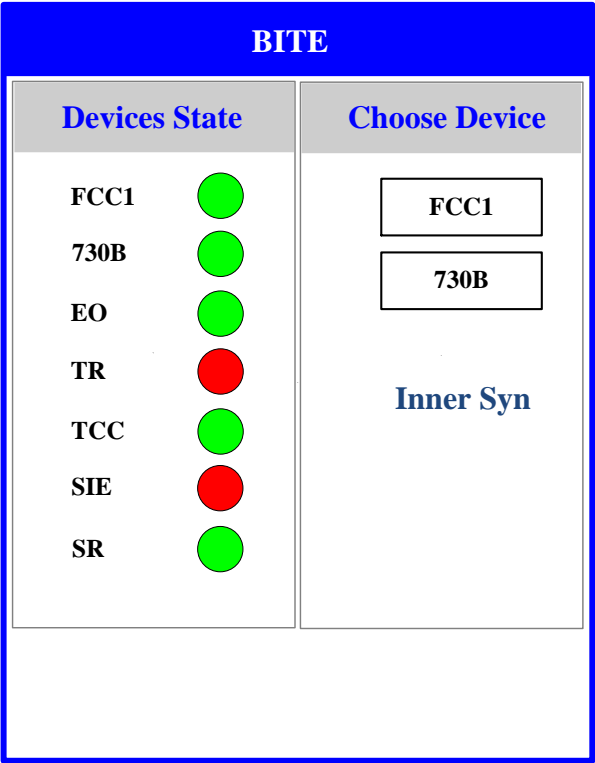


Figure 6-26 “Inner Syn” prompt

Operator can use track ball to select 

FCC1

 area and click the left key of track ball to close the detailed fault list of FCC1, then the main display screen will back to original interface.

## II 730B equipment fault list

Operator can use the track ball to select 730B area and click the left key of track ball, and then the detailed fault list of 730B equipment will be displayed on the main display screen, as shown in figure 6-27.







730B Fault List	
Fire Control Computer	
Azimuth Computer	
High-Low Computer	
High-Low Freq. Converter	
Azimuth Freq. Converter	
Fire Control Freq. Converter	

Figure 6-27 730B equipment fault list

Here:

**Fire Control Computer**



: It represent whether the firing computer is normal or not.

When the indicator is green, firing computer is normal;

When the indicator is red, firing computer is fault.

**Azimuth Computer**



: It represent whether the azimuth computer is normal or not.

When the indicator is green, azimuth computer is normal;

When the indicator is red, azimuth computer is fault.

**High-Low Computer**



: It represent whether the High-Low computer is normal or not.

When the indicator is green, High-Low computer is normal;

When the indicator is red, High-Low computer is fault.

**High-Low Freq. Converter**



: It represent whether the High-Low Freq. Converter normal or not.

When the indicator is green, High-Low Freq Converter is normal;

When the indicator is red, High-Low Freq Converter is fault.

**Azimuth Freq. Converter**



: It represent whether the Azimuth Freq. Converter normal or not.

When the indicator is green, azimuth Freq Converter is normal;

When the indicator is red, azimuth Freq Converter is fault.

**Fire Control Freq. Converter**



: It represent whether the Fire Control Freq.

Converter normal or not.

When the indicator is green, Fire Control Freq. Converter is normal;

When the indicator is red, Fire Control Freq. Converter is fault.

Operator can use track ball to select 730B area and click the left key of track ball to close the detailed fault list of 730B, and the main display screen will back to original interface.



## 6.2 Touch screen

The operation mode and parameter input data of FCC1 can be set in the touch screen. The touch screen is a very important part for human machine interaction, most of FCC1 operation can be finished through using the touch screen.

SYS CTRL	LOCAL CTRL	Ctrl Gun	Video	Data Record	Lock Screen
NAV Setting	Weather Setting	CAL Setting			
			Zero Fly Off		

Figure 6-28 The diagram of touch screen

After power-on, self-check and initialization of FCC1 had been accomplished, the menu of first line in the touch screen is 【SYS CTRL】 (system control)、【LOCAL CTRL】 (Local control)、【Ctrl Gun】 (gun control)、【Video】 (video control)、【Data Record】、【Lock Screen】.

Here, 【SYS CTRL】 key and 【LOCAL CTRL】 key is mutually exclusive. When power is on, the default state of system is 【SYS CTRL】.

At state of 【SYS CTRL】, FCC1 can be controlled by the combat system and receive instructions from TCC;

At state of 【LOCAL CTRL】, FCC1 does not controlled by the system, and does not receive instructions from TCC. FCC1 is at state of local control and takes over the fire control subsystem.

The first menu of others is the function menu. The function menu can be used at state of 【SYS CTRL】 or 【LOCAL CTRL】, and main functions include:

At 【Ctrl Gun】 menu, the various operations of gun can be achieved in real time;

At 【Video】 menu, operator can select video to adjust contrast, brightness, gain, etc.

At 【Data Record】 menu, operator can record data;

【Lock Screen】 is lock screen key.

### 6.2.1 【SYS CTRL】

In 【SYS CTRL】 menu, there are 【Nav Setting】 (navigation data setting)、【Weather Setting】 (weather data setting)、【CAL Setting】 (fire correction setting) and zero flight mode setting, etc. (as shown in Fig7-29).

#### 6.2.1.1 【Nav Setting】

Click 【Nav Setting】 key, the navigation data setting window will be displayed in the main screen, including:

NAV Setting	
<input checked="" type="radio"/> <b>Auto</b>	<input type="radio"/> <b>Manual</b>
Heading <input type="text" value="0.00"/> °	Speed <input type="text" value="0.00"/> Kn
Pitch <input type="text" value="0.00"/> °	Roll <input type="text" value="0.00"/> °
LON <input type="text" value="0.00000000"/> °	LAT <input type="text" value="0.00000000"/> °
ALT <input type="text" value="0.00"/> m	
[Enter] select, [Up ]& [Down] move	

Figure 6-29 The diagram of navigation data setting window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the navigation data of own ship. At “Auto” mode, FCC1 will use the navigation data from the system as the navigation data of own ship.

At “Manual” mode, FCC1 will use the navigation data set by manual. At the time, operator can use small numeric keyboard to input data at menus, such as heading menu, speed menu, etc. when data is input, press 【Confirm】 key in the small numeric keyboard (operation available) or 【Cancel】 key (operation invalidation), and the navigation data setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

After power is on, the default is “Auto”.

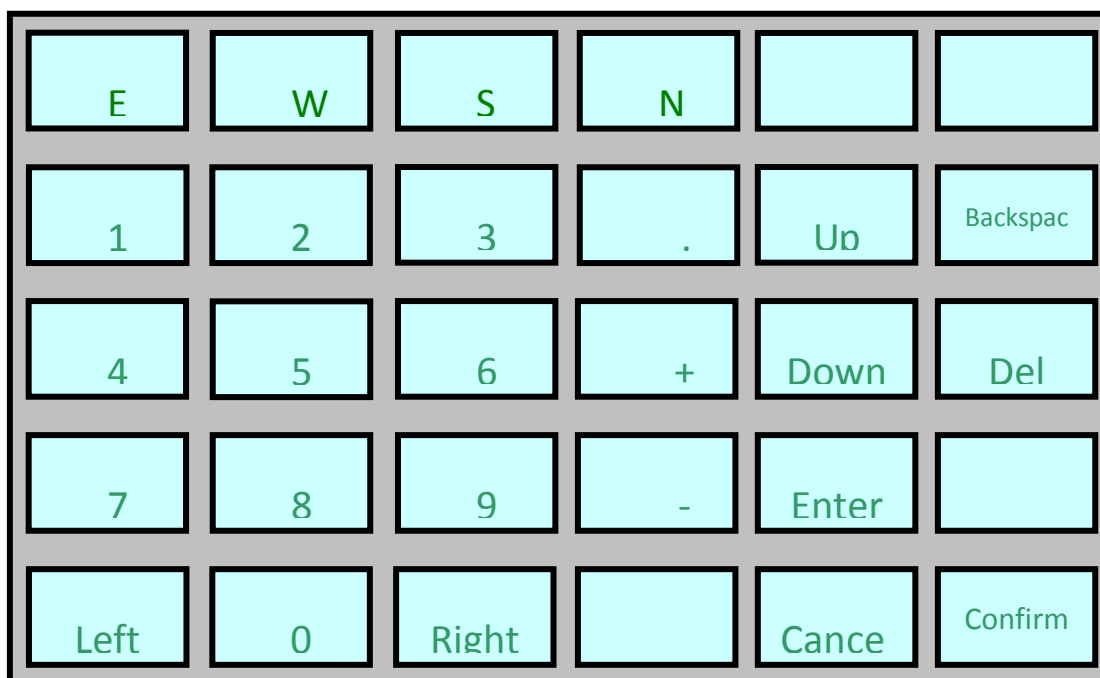


Figure 6-30 The diagram of small numeric keyboard

#### 6.2.1.2 【Weather Setting】

Click 【Weather Setting】 key, meteorological parameter setting window will be displayed in the main screen, including:

Weather Setting			
<input checked="" type="radio"/>	Auto	<input type="radio"/>	Manual
W S	<input type="text" value="0.00"/>	m/s	W D <input type="text" value="0.00"/> °
Temp.	<input type="text" value="0.00"/>	℃	Humi. <input type="text" value="0.00"/> %
Air P	<input type="text" value="0.00"/>	hPa	
[Enter] select, [Up ]& [Down] move			

Figure 6-31 The diagram of meteorological parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the meteorological parameter. At “Auto” mode, FCC1 will use the meteorological parameter from the system as the meteorological parameter of own ship.

At “Manual” mode, FCC1 will use the meteorological parameter set by manual. At the time, operator can use small numeric keyboard to input data at menus, such as wind speed, wind direction, etc. when data is input, press 【Confirm】 key in the

small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the meteorological parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

After power is on, the default is “Auto”.

#### 6.2.1.3 **【CAL Setting】**

Click **【CAL Setting】** key, the fire correction setting window will be displayed in the main screen, including:

CAL Setting		
ΔBE	0.00	mrad
ΔEL	0.00	mrad
ΔD	0	m
[Enter] select, [Up ]& [Down] move		

Figure 6-32 The diagram of fire correction set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the fire correction parameter. when data is input, press **【Confirm】** key in the small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the fire correction parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

#### 6.2.1.4 **【Zero Fly Off/On】**

The function of **【Zero Fly Off/On】** key is to set up zero flight mode. When press **【Zero Fly Off/On】** key at one time, it will switch the state between Off and On at one time.

**【Zero Fly Off】** indicates turn off the zero flight mode;

**【Zero Fly On】** indicates turn on the zero flight mode.

Note: When zero fly mode is turned on, that is the **【Zero Fly Off/On】** key light is turned on and showing as **【Zero Fly On】**, a red prompt character of **【Zero Fly On】** will be displayed in lower left corner of situation area in main interface to represent zero fly operation mode is performed now; When zero fly mode is turned off, that is the **【Zero Fly Off/On】** key light is turned off and showing as **【Zero Fly Off】**, the red prompt character in lower left corner of situation area will disappear to represent it's not the zero fly operation mode at present.

### 6.2.2 【LOCAL CTRL】

The main content of 【LOCAL CTRL】menu includes【Combat】(combat operation mode) and 【Check】 (check operation mode). Those two operation modes are interlocked.

The initial operation mode is set up to 【Combat】 .

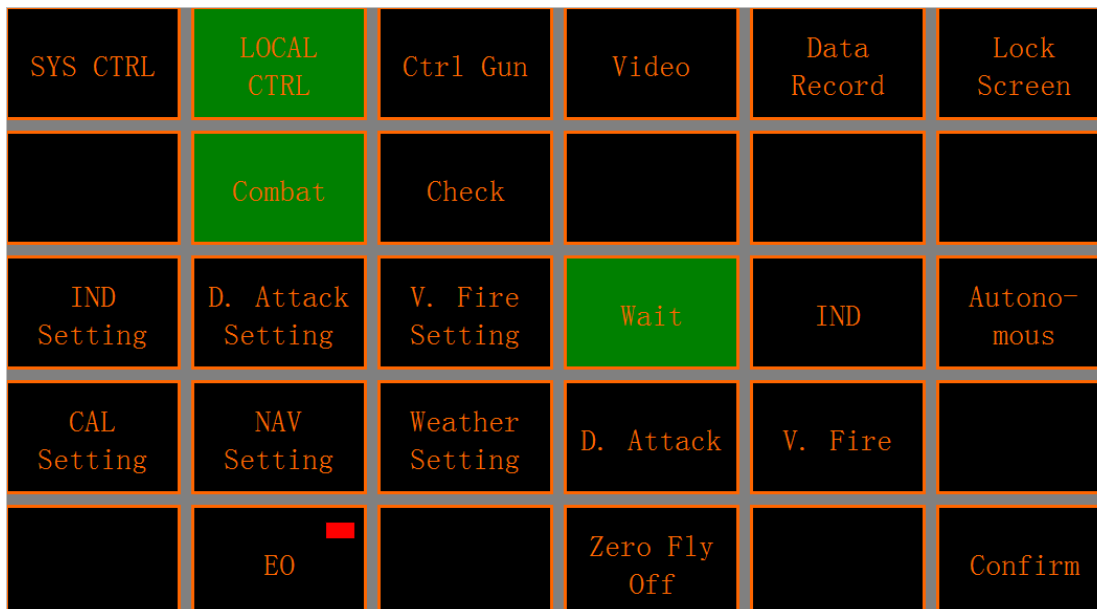


Figure 6-33 The diagram of 【LOCAL CTRL—Combat】

#### 6.2.2.1 【Combat】

Under 【Combat】 operation mode, it can set up parameters and operation modes.

##### ➤ Parameter setup

Available parameter setup includes:

- 【IND Setting】 (target designation parameter setting);
- 【D. Attack Setting】 (direct attack parameter setting);
- 【V. Fire Setting】 (virtual fire parameter setting);
- 【CAL Setting】 (fire correction parameter setting);
- 【NAV Setting】 (navigation parameter setting);
- 【Weather Setting】 (meteorological parameter setting);
- 【EO/TR】 (tracker selection setting);
- 【Zero Fly Off/On】 (zero flight mode setting).

##### a) 【IND Setting】

The 【IND Setting】 key can only be used while FCC1 is under 【Wait】 operation state.

Click 【IND Setting】 key, the touch screen will eject the menu see in figure 6-34.

【FCC1】 , 【TCC】 , 【SR】 , 【TR】 four keys are interlocked, and used to select the source of target designation. Press【BACK】key it will return to the previous menu.

Click 【FCC1】 key, it means target designation sources from FCC1 setting;

Click 【TCC】 key, it means selecting target sources from tactical console;

Click **【SR】** key, it means selecting target sources from search radar;  
Click **【TR】** key, it means selecting target sources from tracking radar.

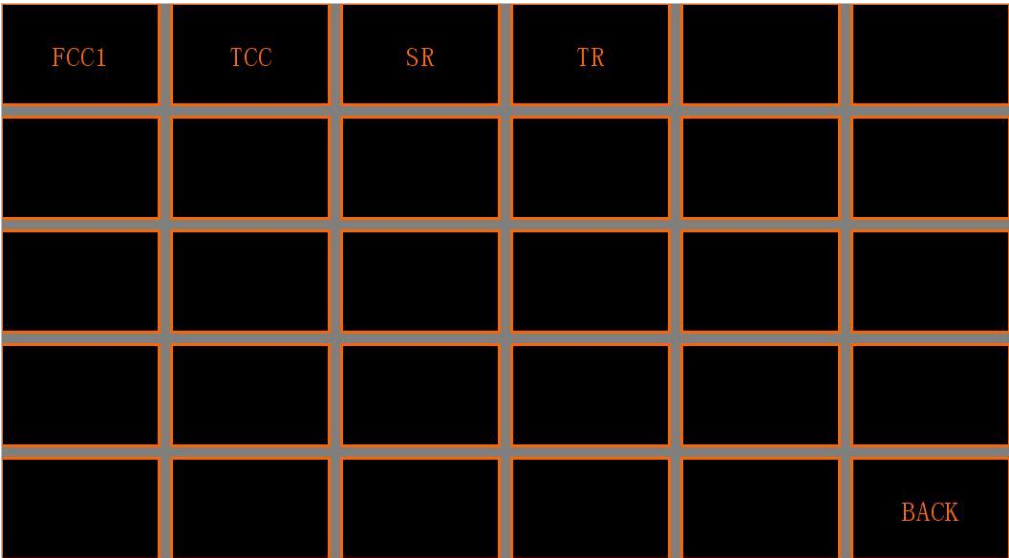


Figure 6-34 The diagram of **【IND Setting】**

Click **【FCC1】** key, the target designation parameter setting window will be displayed in the main screen, including:

IND Setting

☒ Air

☐ Sea

☐ Shore

Batch No.

D  m

AZ  °

EL  °

Course  °

Speed  m/s

[Enter] select, [Up ]& [Down] move

Figure 6-35 the diagram of target designation parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the target designation parameter.

When data is input, press **【Confirm】**key in the small numeric keyboard (operation available ) or **【Cancel】** key (operation invalidation), and the target designation parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

### b) 【D. Attack Setting】

The 【D. Attack Setting】 key can only be used while FCC1 is under 【Wait】 operation state.

Click 【D. Attack Setting】 key, the direct attack parameter setting window will be displayed in the main screen, including:

Figure 6-36 The diagram of direct attack parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the direct attack parameter.

When data is input, press 【Confirm】key in the small numeric keyboard (operation available ) or 【Cancel】 key (operation invalidation), and the direct attack parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

### c) 【V. Fire Setting】

The【V. Fire Setting】key can only be used while FCC1 is under 【Wait】 operation state.

Click 【V. Fire Setting】 key, the virtual fire parameter setting window will be displayed in the main screen, including:

Figure 6-37 The diagram of virtual fire parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the virtual fire parameter.

When data is input, press **【Confirm】** key in the small numeric keyboard (operation available ) or **【Cancel】** key (operation invalidation), and the virtual fire parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

#### d) **【CAL Setting】**

The **【CAL Setting】** key can only be used while FCC1 is under **【Wait】** operation state.

Click **【CAL Setting】** key, the fire correction parameter setting window will be displayed in the main screen, including:

The diagram shows a window titled "CAL Setting" with a blue header. Inside, there are three rows of parameters, each with a label, a numeric input field, and a unit:

$\Delta BE$	0.00	mrاد
$\Delta EL$	0.00	mrاد
$\Delta D$	0	m

At the bottom of the window, there is a text box containing the instruction: "[Enter] select, [Up ]& [Down] move".

Figure

6-38 The diagram of fire correction parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the fire correction parameter. when data is input, press **【Confirm】** key in the small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the fire correction parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.



### e) 【NAV Setting】

The 【NAV Setting】 key can only be used while FCC1 is under 【Wait】 operation state.

Click 【Nav Setting】key, the navigation parameter setting window will be displayed in the main screen, including:

The diagram shows the 'NAV Setting' window with a blue header. It contains two columns of settings. The left column is for 'Auto' mode (selected with a black dot) and includes: Heading (0.00 °), Pitch (0.00 °), LON (0.00000000 °), and ALT (0.00 m). The right column is for 'Manual' mode (unselected with a grey dot) and includes: Speed (0.00 Kn), Roll (0.00 °), and LAT (0.00000000 °). At the bottom, a white box contains the text: [Enter] select, [Up ]& [Down] move.

Figure 6-39 The diagram of navigation parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the navigation data of own ship. At “Auto” mode, FCC1 will use the navigation data from the system as the navigation data of own ship.

At “Manual” mode, FCC1 will use the navigation data set by manual. At the time, operator can use small numeric keyboard to input data at menus, such as heading menu, speed menu, etc. when data is input, press 【Confirm】 key in the small numeric keyboard (operation available) or 【Cancel】 key (operation invalidation), and the navigation data setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

After power is on, the default is “Auto”.

### f) 【Weather Setting】

The 【Weather Setting】 key can only be used while FCC1 is under 【Wait】 operation state.

Click 【Weather Setting】 key, meteorological parameter setting window will be displayed in the main screen, including:

Weather Setting			
<input checked="" type="radio"/>	Auto	<input type="radio"/>	Manual
W S	<input type="text" value="0.00"/>	m/s	W D
			<input type="text" value="0.00"/>
			°
Temp.	<input type="text" value="0.00"/>	℃	Humi.
			<input type="text" value="0.00"/>
			%
Air P	<input type="text" value="0.00"/>	hPa	
[Enter] select, [Up ]& [Down] move			

Figure 6-40 The diagram of meteorological parameter set window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the meteorological parameter. At “Auto” mode, FCC1 will use the meteorological parameter from the system as the meteorological parameter of own ship.

At “Manual” mode, FCC1 will use the meteorological parameter set by manual. At the time, operator can use small numeric keyboard to input data at menus, such as wind speed, wind direction, etc. when data is input, press **【Confirm】** key in the small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the meteorological parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

After power is on, the default is “Auto”.


#### g) **【EO/TR】**

The **【EO/TR】** key can only be used while FCC1 is under **【Autonomous】** operation state. At the time, the rectangle symbol in top right corner of **【EO/TR】** key will from red to white, it represents the key is unlock now.


Every time press **【EO/TR】** key, it will switch the state between **【EO】** and **【TR】** at one time.

When **【EO】** key is on, FCC1 will select tracking data from EO tracker as tracking



data source. At that time, the symbol of “” will be displayed in lower right corner of situation area in main display interface, and the state and data of EO tracker will be displayed in main display interface synchronously. When **【TR】** key is on, FCC1 will select tracking data from tracking radar as tracking data source.



At that time, the symbol of “” will be displayed in lower right corner of situation area in main display interface, and the state and data of tracking radar

will be displayed in main display interface synchronously.  
After power is on, the default is “EO”.

#### **h) 【Zero Fly Off/On】**

The function of **【Zero Fly Off/On】** key is to set up zero flight mode. Every time press **【Zero Fly Off/On】** key, the state will switch between off and on at one time.

**【Zero Fly Off】** indicates turn off zero flight mode.

**【Zero Fly On】** indicates turn on zero flight mode.

Note: When zero fly mode is turned on, that is the **【Zero Fly Off/On】** key light is turned on and showing as **【Zero Fly On】**, a red prompt character of **【Zero Fly On】** will be displayed in lower left corner of situation area in main interface to represent zero fly operation mode is performed now; When zero fly mode is turned off, that is the **【Zero Fly Off/On】** key light is turned off and showing as **【Zero Fly Off】**, the red prompt character in lower left corner of situation area will disappear to represent it's not the zero fly operation mode at present.

#### ➤ Operation mode setting

The available operation modes include:

**【Wait】** (wait operation mode);

**【IND】** (target designation operation mode);

**【Autonomous】** (autonomous operation mode);

**【D. Attack】** (direct attack operation mode);

**【V. Fire】** (virtual fire operation mode).

Those five operation modes are interlocked. Entered into above five states throughout click the relative **【Wait】**, **【IND】**, **【Autonomous】**, **【D. Attack】**, **【V. Fire】** key on touch screen, and then press **【Confirm】** key, FCC1 will switch to the relative operation mode. Corresponding operation state will be displayed in local state parameter area of main display interface synchronously.

The initial default operation state is **【Wait】**.

## 6.2.2.2 【Check】

Under 【Check】 operation mode, there are ten types of check operation mode for a great variety of equipments and system checking.



Figure 6-41 The diagram of 【LOCAL CTRL—Check】

## ➤ 6.2.2.2.1 【EO FCS Static】

Click 【EO FCS Static】 key, it will enter into static check state for EO fire control system. The main display screen will eject EO fire control system static check state problem set window.

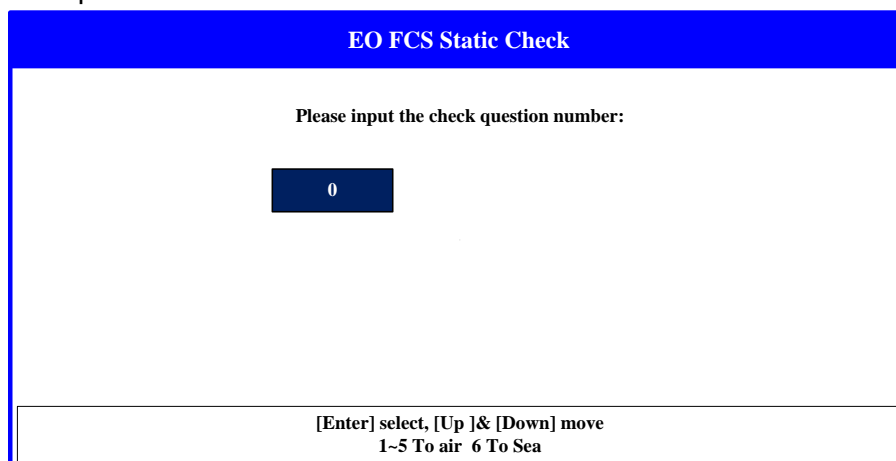


Figure 6-42 The diagram of 【EO FCS Static】

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press【Check Start】key, FCC1, 730B gun, and EO will conduct joint operation check. At this movement, the main display screen will eject error statistic window and problems' content window.

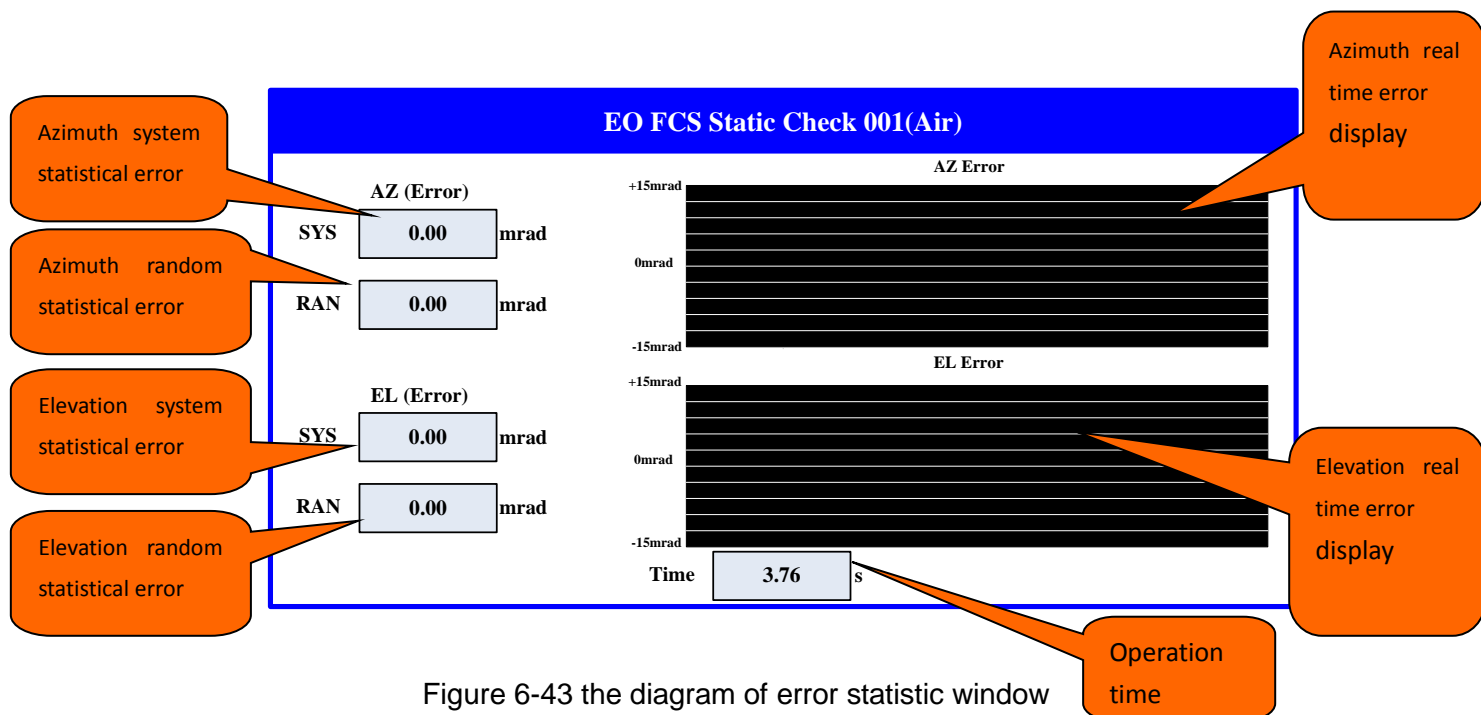


Figure 6-43 the diagram of error statistic window

During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Problem content window:

EO FCS Static Check 001(Air)					
IND Data			Weather Data		
D	0.00	m	W S	0.00	m/s
AZ	0.00	°	W D	0.00	°
EL	0.00	°	Temp	0.00	°C
Course	0.00	°	Humi.	0.00	%
Speed	0.00	m/s	Air p	0.00	hPa
NAV Data					
Pitch	0.00	°	Roll	0.00	°
Heading	0.00	°			

Figure 6-44 Problem window

Press 【Check Stop】 key, the check is finished, error statistic window and problem content window are also closed. The interface backs to the original main display interface.

➤ **【EO FCS Dynamic】**

Click **【EO FCS Dynamic】** key, it will enter into dynamic check state for EO fire control system. The main display screen will eject EO fire control system dynamic check state problem set window.

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, FCC1, 730B gun, and EO will conduct joint operation check. At this movement, the main display screen will eject error statistic window and problems' content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and problem content window are also closed. The interface backs to the original main display interface.

➤ **【EO Semi Static】**

Click **【EO Semi Static】** key, it will enter into semi static check state for EO fire control system. The main display screen will eject EO fire control system semi static check state problem set window.

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, FCC1, and EO will conduct joint operation check. At this movement, the main display screen will eject error statistic window and problems' content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and problem content window are also closed. The interface backs to the original main display interface.

➤ **【EO Semi Dynamic】**

Click **【EO Semi Dynamic】** key, it will enter into semi dynamic check state for EO fire control system. The main display screen will eject EO fire control system semi dynamic check state problem set window.

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, FCC1, and EO will conduct joint operation check. At this movement, the main display screen will eject error statistic window and problems' content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and problem content window are also closed. The interface backs to the original main display interface.

➤ **【FCC1&Gun】**

Click **【FCC1&Gun】** key, it will enter into FCC1 fire control console and 730B gun joint operation check state. The main display screen will eject problem set window. This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, FCC1, and 730B gun will conduct joint operation check. At this movement, the main display screen will eject error statistic window and problems' content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and problem content window are also closed. The interface backs to the original main display interface.


➤ **【Gun Static】**

Click **【Gun Static】** key, 730B gun will enter into control-gun in jumping mode check state. The main display screen will eject check parameter set window.

Window contents are as follow:

Figure 6-45 The diagram of **【Gun Static】**

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When azimuth enable option is set as : it represents azimuth enable switch is turned on, at the time, azimuth servo system of gun participates in jumping mode check and rotates according to designed azimuth jumping angle;

When azimuth enable option is set as ☐: it represents azimuth enable switch is turned off, at the time, azimuth servo system of gun dose not participate in jumping mode check, and azimuth of gun should stay still;

When elevation enable option is set as ☒: it represents azimuth enable switch is turned on, at the time, elevation servo system of gun participates in jumping mode check and rotates according to designed elevation jumping angle;

When elevation enable option is set as ☐: it represents elevation enable switch is turned off, at the time, elevation servo system of gun dose not participate in jumping mode check, and elevation of gun should stay still;

When data is input, press【Check Start】key, the check start. At this movement, the main display screen will eject error statistic window and parameter set window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Parameter setup window:

Gun Static Check

BE	EL
<div><input checked="" type="checkbox"/> Enable</div>	<div><input checked="" type="checkbox"/> Enable</div>
<div>BE<div>0.00°</div></div>	<div>EL<div>0.00°</div></div>

Figure 6-46 Parameter set window content of control gun in jumping mode check state  
Press 【Check Stop】 key, the check is finished, error statistic window and parameter set window are also closed. The interface backs to original main display interface.



➤ 【Gun Speed】

Click 【Gun Speed】 key, 730B gun will enter into control gun in constant velocity mode check state. The main display screen will eject check parameter set window.

Window contents are as follow:

Gun Speed Check

☒ BE Enable

BE Speed  °/s

Left Limit  °

Right Limit  °

☐ EL Enable

EL Speed  °/s

Down Limit  °

Up Limit  °

[Enter] select, [Up ]& [Down] move

Figure 6-47 The diagram of 【Gun Speed】

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press【Check Start】key, the check start. At this movement, the main display screen will eject error statistic window and parameter set window. During the process of check, the error statistic window will show the real time error. When check is finished, the error statistic window will give the result of error statistic.

Parameter set window contents are as follow:

Gun Speed Check

BE	EL
<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable
Speed <input type="text" value="0.00"/> °/s	Speed <input type="text"/> °/s
L Limit <input type="text" value="0.00"/> °	D Limit <input type="text"/>
R Limit <input type="text" value="0.00"/> °	U Limit <input type="text"/>

Figure 6-48 Parameter set window content of control gun in constant velocity mode check state

Press 【Check Stop】 key, the check is finished, error statistic window and parameter set window are also closed. The interface backs to original main display interface.

➤ 【Gun Sin】

Click 【Gun Sin】key, 730B gun will enter into control gun in sine mode check state.  
The main display screen will eject check parameter set window.  
Window contents are as follow:

Gun Sin Check

☒

BE Enable

BE Amplitude

☐

EL Enable

EL Amplitude

BE Center

BE Period

EL Center

EL Period

[Enter] select, [Up ]& [Down] move

Figure 6-49 The diagram of 【Gun Sin】

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press【Check Start】key, the check start. At this movement, the main display screen will eject error statistic window and parameter set window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Parameter set window content are as follow:

Gun Sin Check

BE

EL

☒

Enable

Center

Amp.

Period

☐

Enable

Center

Amp.

Period

Figure 6-50 Parameter set window content of control gun in sine mode check state

Press 【Check Stop】 key, the check is finished, error statistic window and parameter set window are also closed. The interface backs to original main display interface.

➤ **【FCC1 Static】**

Click **【FCC1 Static】** key, FCC1 will enter into single static check state. The main display screen will eject check problem set window.

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, the check start. At this movement, the main display screen will eject error statistic window and problem content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and parameter set window are also closed. The interface backs to original main display interface.

➤ **【FCC1 Dynamic】**

Click **【FCC1 Dynamic】** key, FCC1 will enter into single dynamic check state. The main display screen will eject check problem set window.

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the problems.

When data is input, press **【Check Start】** key, the check start. At this movement, the main display screen will eject error statistic window and problem content window. During the process of check, the error statistic window will display the real time error. When check is finished, the error statistic window will give the result of error statistic.

Press **【Check Stop】** key, the check is finished, error statistic window and problem content window are also closed. The interface backs to original main display interface.

Note: In **【Check】** mode, press **【Check Start】** key, the check is started, at the time FCC1 can not enter into **【Combat】** mode, and the rectangle symbol in top right corner of **【Combat】** key will from white to red, it represents the key is locked now. When press **【Check Stop】** key, the rectangle symbol in top right corner of **【Combat】** key will from red to white, it represents the key is unlock, FCC1 can enter into **【Combat】** mode now.

### 6.2.3 【CTRL GUN】

The main content of 【CTRL GUN】 menu see figure 6-51, all of those keys are designed for gun control. According to the function, it divided as below:

Servo power-on control;

Gun coordination control;

Return zero control;

Shut down control;

Drum selection control;

Rate of fire selection control;

Residual rounds setting;

Fire time setting.



Figure 6-51 The diagram of 【Ctrl Gun】

#### 6.2.3.1 Servo power-on control

Press【Servo On】key, the light of【Servo On】key is turn to green, FCC1 fire control console will send servo power-on control instruction to 730B gun. When gun received the instruction, it power on the servo, and report to FCC1 fire control console. When FCC1 received the state, FCC1 will display the state at gun state display zone on main display screen.

When cancel the instruction, turn off 【Servo On】 key (the light of 【Servo On】 key is turn off).

#### 6.2.3.2 Gun coordination control

Press 【COO Enable/Disable】 key, the light of 【COO Enable/Disable】 key is turn to green and display 【COO Enable】 , FCC1 will send open coordination enable instruction to 730B gun. In normal, when gun received the instruction, it will move following gun control data sent by FCC1 fire control console.

Press 【COO Enable/Disable】 key, the light of 【COO Enable/Disable】 key is turn off and display 【COO Disable】 , FCC1 will send close coordination enable instruction to 730B gun. In normal, when gun received the instruction, it will stop moving and will not move following gun control data sent by FCC1.

#### 6.2.3.3 Return zero control

Press **【Return Zero】** key, the light of **【Return Zero】** key is turn to green, FCC1 will send return zero instruction to 730B gun. When gun received the instruction, it will return to zero. After finish returning zero, gun will report to FCC1. When FCC1 receive the state, the light of **【Return Zero】** will be turned off.

Note: **【Return Zero】** key is locked. Only when FCC1 received the signal of “servo power-on” from gun, the key is to be unlocked and the rectangle symbol in top right corner of the key will from red to white.

#### 6.2.3.4 Shut down control

Press **【Turn Off】** key, the light of **【Turn Off】** key is turn to green, FCC1 will send the instruction to 730B gun. When gun received the instruction, it will shut down. After shut down, gun will report to FCC1. When FCC1 receive the state, the light of **【Turn Off】** will be turned off.

Note: **【Turn Off】** key is locked. Only when FCC1 received the signal of “servo power-on” from gun, the key is to be unlocked and the rectangle symbol in top right corner of the key will from red to white.

#### 6.2.3.5 Drum selection control

Use **【R Drum】** key (right drum) or **【L Drum】** key (left drum) to conduct drum selection control.

Press the drum key as it want to be set, when the relative key is turned green, the drum selection control is finished.

**【R Drum】** key and **【L Drum】** key are interlocked.

#### 6.2.3.6 Rate of fire selection control

Use **【High】** key (high rate of fire), **【Middle】** key (middle rate of fire), and **【Low】** key (low rate of fire) to conduct rate of fire selection control.

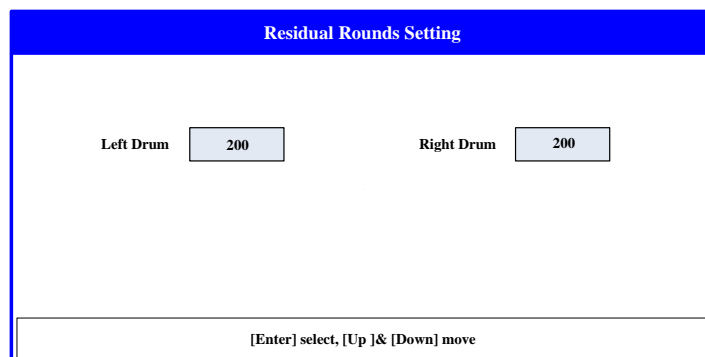
Press the relative key as it wants to be set, when the relative key is turned green, the rate of fire selection control is finished.

**【High】** key, **【Middle】** key, and **【Low】** key are interlocked.

### 6.2.3.7 Residual rounds setting

Press **【RR Setting】** key, the residual rounds parameter setting window will be displayed in the main screen.

Residual rounds parameter setting window contents are as follow:



The image shows a software window titled "Residual Rounds Setting" with a blue header. Inside the window, there are two input fields. The first is labeled "Left Drum" and contains the number "200". The second is labeled "Right Drum" and also contains the number "200". At the bottom of the window, there is a text box that reads "[Enter] select, [Up ]& [Down] move".

Figure 6-52 Residual rounds parameter setting window

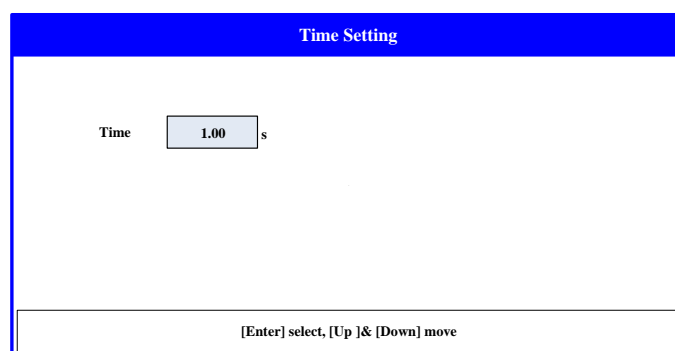
This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the residual rounds parameter in right drum and left drum.

When data is input, press **【Confirm】**key in the small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the residual rounds parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

### 6.2.3.8 Fire time setting

Press **【Time Setting】**key, the fire time parameter setting window will be displayed in the main screen.

Fire time parameter setting window contents are as follow:



The image shows a software window titled "Time Setting" with a blue header. Inside the window, there is a single input field labeled "Time" which contains the value "1.00" followed by a small "s" for seconds. At the bottom of the window, there is a text box that reads "[Enter] select, [Up ]& [Down] move".

Figure 6-53 Fire time parameter setting window

This window and the small numeric keyboard can be displayed in the touch screen simultaneously. Operator can use the small numeric keyboard to set the fire time fire time.

When data is input, press **【Confirm】**key in the small numeric keyboard (operation available) or **【Cancel】** key (operation invalidation), and the fire time parameter setting window of own ship and the small numeric keyboard will disappear at same time to original interface.

#### 6.2.4 【Video】

The main content of 【Video】 menu see figure 6-54.

SYS CTRL	LOCAL CTRL	Ctrl Gun	Video	Data Record	Lock Screen
			TV	IR	
Bright +	Bright -	Contrast +	Contrast -	Gain +	Gain -

Figure 6-54 The diagram of 【Video】

Here:

【TV】 key and 【IR】 key are used to select video frequency input source.

Those two keys are interlocked. When press 【TV】 key, the light of 【TV】 key is turn to green, FCC1 will select video frequency signal sent by EO as video frequency input source. It will display at the video frequency area on main display screen;  
When press 【IR】 key, the light of 【IR】 key is turn to green, FCC1 fire console will select infrared video frequency signal sent by EO as video frequency input source. It will display at the video frequency zone on main display screen;

【Bright +】 key and 【Bright -】 key are used to adjust the brightness for video frequency.

Press 【Bright +】 key, the brightness is increasing;

press 【Bright -】 key, the brightness is decreasing.

【Contrast+】 key and 【Contrast-】 key are used to adjust the contrast for video frequency.

Press 【Contrast+】 key, the contrast is increasing;

press 【Contrast-】 key, the contrast is decreasing.

【Gain+】 key and 【Gain-】 key are used to adjust the gain for video frequency.

Press 【Gain+】 key, the gain is increasing;

press 【Gain-】 key, the gain is decreasing.

6.2.5 【Data Record】

The main content of 【Data Record】 menu see figure 6-55, it is mainly used for data extraction control.

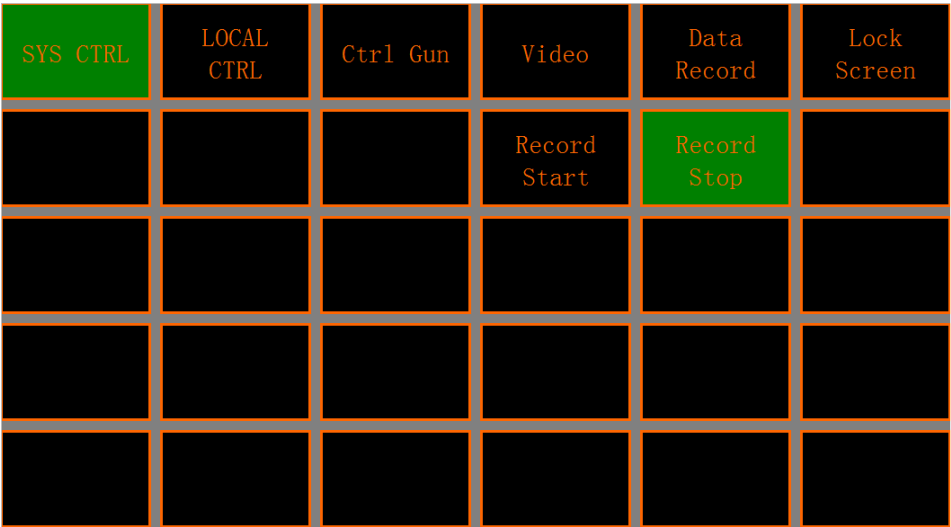


Figure 6-55 The diagram of 【Data Record】

Press 【Record Start】 key, it begin to record data;  
Press 【Record Stop】 key, it stop recording data.  
Recorded files will be memorized in fcc data folder in DOS disk drive.



## 7. INSTALLATION

Before using at the use places in first time, the installation method of FCC1 is shown as below:

- During the transportation, FCC1 should use special packing chest to pack. When arrive at the destination, it should be careful during hoisting and stripping off the package so as to avoid damaging the FCC1;
- The installation method of FCC1 in container is shown as below: keep FCC1 in level at the installation place, install and lock the bolt between shock absorber and floor respectively under the natural mode (none stress) for FCC1 bottom shock absorber. And then install and lock the bolt between shock absorber at back and bulkhead respectively.

## 8. START UP AND OPERATION NOTICE

### 8.1 Start Up

#### 8.1.1 Preparation before Start Up

##### 8.1.1.1 Preparation before daily start up

- To ensure the supply voltage is AC 220V (the voltage variation range is 198V~242V) throughout using multimeter;
- To check and ensure the ground terminal of FCC1 is already earth reliably.

##### 8.1.1.2 Preparation before start up after finishing first time operation and maintenance

After FCC1 operation and maintenance at first time, FCC1 should be check, if it is operating normal and then start up.

- Appearance check  
To observe every modules whether have damage or not; operating and display unit whether have damage and break off or not; internal connection cable and element whether break off or not; linker connector pin whether have distortion or not; once there are any unusual, dispose in time.
- Installation correctness check  
To check the correctness of external cable for equipment. Check FCC1 internal patch cord connection correctness according to wire list; Check every plugs of linker whether have loosing or not; check every module in internal of FCC1 should be at “on” mode.
- Insulating property and supply power check  
When FCC1 power supply switch is at “on” mode, check and ensure the insulating standard of power supply input to ground terminal  $\geq 20\text{M}\Omega$  in normal atmosphere and  $\geq 0.2\text{M}\Omega$  under hot hamiding condition throughout 500V tramegger; after measure, put the FCC1 power supply switch at “off” mode; check and ensure the supply voltage is AC 220V (the voltage variation range is 198V~242V) throughout voltmeter; According to FCC1 wire list, connect the input and output cable between FCC1 and external equipment exactly; FCC1 ground terminal is earth reliably.

## 8.2 Operation

After finish preparation before start up, press FCC1 power supply switch, FCC1 indicator light should be lit, the ventilating fan at the back of case and FCC1 should be running immediately; after the program is done loading, FCC1 can operate normally.

Use and notes:

- Do not insert and draw cable with power on
- Do not insert and draw computer boards with power on;
- If the equipment can not operating normal, power off and remove trouble;
- After power off and power on again, the interval time should be no less than 60 seconds so as to avoid current impact and impact a double life.

## 9. MAINTENANCE

FCC1 is composed of electron, electrical element, and mechanical parts. The correct operating and maintenance play an important role on guarantying well operation and realizing high reliability. The content of FCC1 maintenance is shown as below:

- Keep FCC1 internal environment and operating environment clean;;
- Keep FCC1 mechanical drive part oiled, when guide rail is using for a period (above one year), coated grease to maintenance;
- In order to keep FCC1 in well operation mode, after storing for a period (within half a year), it need power on to check in certain time;
- For cleaning FCC1 appearance by using soft cotton, it is prohibit using corrosivity solvent to clean so as to avoid damaging coating.

### 9.1 Module Function Check

Turn FCC1 power supply switch to “on” position, power on ruggedized computer, display and other module, after the system is power on, to check every hardware module step be step.

### 9.2 Repairability Maintenance

The repairability maintenance is to maintain the trouble during check, so as to make equipment recover performance. The configured display, operation module, ruggedized computer, and other module for FCC1 could be installed and dismantled individually without FCC1.

#### 9.2.1 Display

The display is installed at the top of FCC1, it should carry out off-line maintenance, the maintenance step of display is shown as below, after maintenance, and the installation is in reverse order.

- Loosen four screws at display panel, flip to the left to open display;
- Draw all cable plugs connected with display, remove ground wire, remove hinge connected with FCC1, bring out the display, and carry out off-line maintenance.

#### 9.2.2 Ruggedized Computer

The ruggedized computer is installed at the internal of electronics box unit. It should carry out off-line maintenance, the maintenance step of display is shown as below, after maintenance, and the installation is in reverse order.

- Open the left door of electronics box unit;
- Loosen loose screw at both left and right sides of ruggedized computer panel, bring out the ruggedized computer from electronics box unit;

- Draw all cable plugs connected with ruggedized computer, remove ground wire;
- Press limit shrapnel of left and right guide rail, pull out the ruggedized computer and holding the ruggedized computer, remove screws connected with guide rail and ruggedized computer as well as screws connected with fastener and rear of ruggedized computer, bring out the ruggedized computer, and carry out off-line maintenance.

### 9.2.3 Operation Unit Component

#### 9.2.3.1 Track ball and programmable touch keyboard

It should carry out off-line maintenance, the maintenance step is shown as below, after maintenance, and the installation is in reverse order.

- Loosen loose screw at the corresponding module;
- Lift the module from operation console, draw cable plug, and then carry out off-line maintenance.

#### 9.2.3.2 USB interface extension module

It should carry out off-line maintenance, the maintenance step is shown as below, after maintenance, and the installation is in reverse order.

- Draw all plugs at the USB interface extension module;
- Loosen two fastening screws under operation console framework, upturn the operation unit to 90°;
- Loosen fastening screw connected operation console under USB interface extension module, remove USB interface extension module and carry out off-line maintenance.

Notes: when put down the operation console, the locating dewel should be pulled out.

#### 9.2.3.3 Maintenance for power supply switch, reset switch, indicator light, and buzzer

It should carry out off-line maintenance, the maintenance step is shown as below, after maintenance, and the installation is in reverse order.

- Loosen fastening screw, and remove installation board;
- Burn connecting wire by hot brand iron;
- Loosen screw of power supply switch, reset switch, indicator light, and buzzer, remove those components to replace and maintenance.

#### 9.2.3.4 Gun control module

It should carry out off-line maintenance, the maintenance step is shown as below, after maintenance, and the installation is in reverse order.

- Loosen fastening screw, and remove installation board;
- Draw all plugs at gun control module, and carry out replacement and maintenance.

#### 9.2.4 Blower Fan

It should carry out off-line maintenance, the maintenance step is shown as below, after maintenance, and the installation is in reverse order.

- When dismantle blower fan at back. Loosen four fastening screws on left and right display panel at first, pull out the display, draw all cable plugs connected with display, remove ground wire, bring out display;
- Remove fastening screws on blower fan installation board;
- Lift blower fan installation board, draw blower fan power supply plug;
- Remove blower fan from back plate to carry out off-line maintenance;
- When blower fan is continued to operate almost 200h, it need to add the precise instrument grease at one time, after operating 3000h, it need to replace the new blower fan.

### 9.3 Minor Failure and Elimination Methods

The minor failure and elimination methods of FCC1 see table 9-1:

Table 9-1 Failure and elimination methods for FCC1

SN	Fault phenomenon	Reason analysis	Maintenance methods
1	There do not have any reaction after start up	It is possible that the power supply do not have reliable suppliers.	To check whether power supply is operating normal or not; check voltage is with in voltage fluctuation scope; check power line connected correctly; check whether power supply switch is operating normal or not.
2	There is no blower fan sound after start up	It is possible that the power supply do not have reliable suppliers.	Check blower fan power line connected correctly; if blower fan is damaged replace the blower fan.
3	There is no image on display	It is possible that the signal input is not connected or the display is not power on.	Check computer whether is operating normal or not; check display operation light whether is lit or not; if display is damaged, replace display; check display connected line is operating normal.
4	The display color is color inconsistency	It is possible that the signal input is not connected.	Check ruggedized computer tart up; if display is damaged, replace display; check display connected line whether is operating normal or not.
5	The operation components do not have any appropriate action after operation	It is possible that the components are damaged or related attachment is loose or computer interface is fault.	Check related connected line whether is loose or not; if related line is normal, then replace components; if computer interface is damaged, replace the interface.
6	There is failure on inside card of ruggedized computer	It is possible that the card is damaged.	Replace spare parts.