OPERATING MANUAL

FOR
SMIT-301MH

STREAM SELECTOR

Manufactured By:

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CHAPTER 1

1.1 INTRODUCTION

This STREAM SELECTOR UNIT is a miniature version of Samyak make stream selector. The unit has 20 characters x 4 lines LCD. This makes it more users' friendly. It is based on a popular 8-bit Microcontroller. The system is designed to control stream selection of up to six-stream system using its Relay outputs and sync Input or Timer. It also generates Sample and Hold analog outputs for each channel.

1.2 SPECIFICATIONS:

1. No. of Streams	Up to 6
2. Mains supply	110-230V AC +/- 10% Single phase, 50 Hz Nominal
3. Key board	12 keys keypad
4. Display	20 * 4 Line Alphanumeric LCD display
5. **Relays**	
For stream selection	Potential free contacts
Total No. Of relays Contact rating	6 2A/250 AC, Resistive
6. Digital Inputs	4. no.
7. Analog Inputs	Up to 2 channels (4-20 mA)
8. Analog Outputs	Up to 6 Channels (one for each stream): 4 to 20mA Latched Output
9. Dimension	Outer: 192 mm (W) x 96mm (H) x 130 mm (D) Weight: 2Kgs Panel cut-out: 186mm (W) x 90 mm (H)
10. Enclosure	General purpose Panel Mount
11.Serial communication	RS 232 OR RS 485 (optional)

CHAPTER 2

2.1 SYSTEM DESCRIPTION

The system is based on an 8-bit micro-controller. It is to be used for selecting one of the six streams in accordance with SYNC input or time based.

With the help of the keypad and display on front, the system allows to set and modify following parameters of each individual stream.

1. Full scale value for Scaling analog input
2. Skip/Un skip a stream
3. Stream On Time
4. Power On status

In pulse mode the system allows to skip/unskip specified stream and in time mode if value of Stream On time is programmed as Zero, it is skipped.

When the system is put in RUN mode, thro' front keypad, the sequence is executed. The relays' contacts are switched ON and OFF as per the predefined sequence.

Contacts will be used to switch on and OFF SOVs fitted in the system.

Analog input is continuously sampled. Value of analog input is continuously displayed in RUN mode. When PAGE key is pressed, latched value for each stream is displayed for stream 1 to 6 respectively. Analog output for each stream is updated after its sampling & analysis is completed.

2.2 HARDWARE DESCRIPTION

Construction of the system is modular. The system consists of:

- CPU CARD
- Front panel (KB/Display)
- Power Supply card
- Relay cards
- Analog I/O cards

2.2.1 CPU CARD

This is based on a single chip controller. The CPU card has interface for 12 keys keypad organized in 4*3 matrixes.

It also supports 20 characters x 4 lines LCD display. The configuration data (Timer value and other parameters) are stored in non-volatile RAM. Battery is not required for retention of data.

Watch dog circuit is incorporated on the CPU card to prevent malfunctioning of the system due to external noise thro' power supply or any other source. If the CPU starts malfunctioning, the watch dog circuit resets it and system will be brought to its Power On status. In such conditions, operator has to restart the operation by keyboard if required.

The card also has provision for four digital inputs. One of the digital inputs is configured as Sync Input. All inputs should be from potential free contacts.

This card supports up to two analog inputs. Analog input is terminated in a 250 ohm resistor.

Power supply card is connected to CPU card thro' reliamate connector.

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2.2.2 POWER SUPPLY CARD

This card provides regulated DC voltages to various cards of the system. It is SMPS. Voltages generated on the card are: +5V/500mA, & +24V/100mA

Operating voltage is 110-230VAC +/-10%.

Three terminals (three male/female type) are mounted on the card to apply mains power.

2.2.3 Relay Card

System can have up to 3 relays cards. Each relay card supports two relays.

All relays are 1 C/O type, 24V DC operated,.

All cards are identical. They are connected with CPU card.

2.2.4 Analog Output Card

Unit supports up to three analog output cards. Each card supports two analog outputs: 4-20 mA type.

The card is connected with CPU card.

2.2.5 BACK PANEL

Male Connectors from all cards are accessible from back panel. Mating female connectors are supplied along with the system. These are screw type terminals.

For back panel connection refer Appendix.

2.2.6 ENCLOSURE

Enclosure is made-up of Metal. Its outer covers are powder coated in grey colour.

2.2.7 FRONT PANEL

It has a keypad with 12 keys and 20 Char x 4 Line alphanumeric LCD.

2.3 INSTALLATION GUIDE

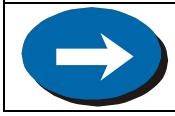
- Unpack the instrument from the packing box carefully.
- Mount the instrument in the panel cutout of 186 **mm x 92 mm**.
- Fix the instrument with the panel using side brackets supplied with instrument.
- All the electrical connections to be done at the back panel of the unit using spade lugs. Refer the Appendix for back panel layout.
- Make sure that no wire is connected loosely to avoid generation of spark and RFI. Connect mains cord on the back panel on the Phase, Neutral and Earth terminals.
- Earth the instrument properly.
- Some of the contacts are powered. Hence don't touch any terminal directly when power is applied to the instrument. Whenever any connection is to be made or removed from the unit, always switch off the power.

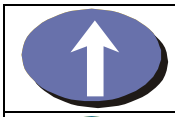
CHAPTER 3 OPERATING DETAILS

The following paragraphs give detailed description of how to operate the unit. For efficient use of the instrument one must study and understand this section.

3.1 Display & Keyboard

The system has 20 characters x 4 lines LCD display. The system has 12 key membrane like keypad organized as 4 x 3 matrix. List of keys and their functions:

KEYS	FUNCTION
	**For Factory Setting**
	**Toggle between Auto and Manual mode**
	**When process is Running, Pause it in Auto/Run mode.** **The timer stops counting. On/Off status of relays remain unchanged**
	**Toggle the operation between Stop and Run Mode in Auto/man mode**
	**Enter into calibration mode through Password 1234**
	**Enter into Parameter Edit page through Password 0101**
	**Go to the next parameter in selected page**
	**Go to the previous parameter in selected page**
	**Enter into edit mode**
	**Select digit**

	**Increment selected Digit value**
	**Save new data and Terminate Edit mode**

Whenever mains is switched on to the unit:

The process will always start in Auto mode. Refer 'RUN' mode of operation for execution/operation of the instrument.

All the Analog outputs will be at 4.00 mA at Power ON.

There are two modes of operation: STOP and RUN mode.

Before entering into RUN mode, one can select Stream no. When 'Edit' key is pressed, the data field of display starts flashing. Use increment key to select desired stream no. Stream number ranges from 1 to 6.

After setting desired value, press Enter key. Display stops flashing.

Now one can either go to Stop mode or Run mode. If you want to start the process, press 'RUN' key. Program will start running in Auto or Manual mode. Select the Auto/Man. Mode using Auto/Man key.

3.2 Edit Mode

In this mode user can verify or update various parameters. One can perform this mode only when the instrument is in Stop mode.

Press 'PAGE' key to enter into Parameter edit mode.

The display will show:

EDIT MODE PASSWORD 0000

The unit is prompting for Password. Password is a 4-digit no. There are two passwords.

Operator's Password-1: 0101
Operator's Password-2: 3210

If Operator's password-1: 0101 is entered, one can edit the following parameters.

Parameter Description	Display in Edit field	Min Value	Max Value
Password	0000		0101
Stream 1to6 in Time & Pulse mode	0000	0000	9999
Stream 1to6 in Pulse mode	SKIP/UNSKIP		SKIP/UNSKIP
Full scale	0000	0000	9999
Power on mode	STOP/RUN		STOP/RUN
DP	0	0.001	0
DELAY	0000	000	999
N0 SAMPLE TIME	0000	000	999

If Operator's password-2: 3210 is entered, one can edit the Type of Trigger that is TIME mode or PULSE mode.

Press 'CAL' key to enter into Calibration mode

The display will show:

CALIBRATION PASSWORD 0000

The unit is prompting for Engineer's Password. 1234. Password is a 4-digit no.

If engineer's password is entered, one can perform calibration of analog input and analog output thro' software using standard source & meter. This is not allowed using operator's Password.

Enter the correct password using data entry keys (Digit select and Increment Key). When 'Enter' key is pressed, data field of display stops flashing. Validity of Password is checked. If wrong password is entered the unit again prompts for correct Password.

If correct password is entered, then the display of data field becomes steady. Now press PAGE key.

Now press 'Edit' key, if you want to modify the parameter. Data field starts flashing. Use increment and digit select key to set parameter. Pressing the 'NEXT' key again & again will display next parameter in the sequence.

NEXT and PREV key is used to select next and previous parameter in calibration and parameter edit mode.

Following the above process, one can select any of the above listed parameters. When the parameter is selected its current value is being displayed.

If one wants to modify, press 'Edit' key to change it. When 'Edit' key is pressed, the display will start flashing indicating that you can modify the digit.

Press 'Enter' key when the new desired value is set. Display will stop flashing.

One can come out of the data entry/programming mode, by pressing 'Stop/Run' key in between. The system will start from first stream in Auto mode and from selected Stream in Manual mode.

If no other operation is preformed, one can still enter into Edit mode without entering password again within 60 seconds. But if any other operation like 'Run' in Auto mode or any other operation in manual mode is performed, you cannot enter into Data entry mode without entering correct Password.

If no key is pressed for more than 60 seconds, the Data entry/programming mode is terminated automatically and display will show:

STREAM SELECTOR VER 2.01 MODE: AUTO SELECTED PROBE N

N = currently selected stream no 1 to 6

To enter into edit mode, you will have to enter Password again.

3.3 How To Enter/Modify Parameter Value

Use Digit select (→), Increment (↑) and 'Enter' key to enter or modify any numeric data.

When in data entry/edit mode, the selected digit will be flashing.

Press increment key, the no. at the selected digit position will increment from 0 to 9 and rolls back to 0 when it reaches at 9.

Once desired digit is set, press digit select key (Right arrow) to select next digit. The next selected digit will flash. Set it to desired value as per the above step.

Once all the digits are set, press 'Enter' key. The display will stop flashing.

POWER ON MODE

The Power On status of the unit is programmable. It is possible to programme/Edit 'Power On statuses in engineers' Password only.

Whenever operator's Password 0101 is entered, the first parameter displayed will be POWER ON MODE. There are two possible 'Power On' modes: Run and Stop.

Press 'EDIT' key. The data field of display will start flashing. Use 'Increment' (Up arrow) key, to select two of the possible Power On modes.

1 RUN MODE

If, the unit is configured for this mode, then whenever Power is switched on to the Unit, it will start executing the sequence in Auto OR Manual mode.

2 STOP MODE

If, the unit is configured for this mode, then whenever Power is switched on to the Unit, it will be in Stopped state in Auto mode OR Manual mode.

3.4 RUN MODE

The modes in which the process can be RUN: Auto and Manual. When the process is in stop mode, one can select Auto or manual mode by pressing 'Auto/Man' key. Every time this key is pressed, the mode of the process is toggled between Auto and Manual. Now we will explain each mode in detail:

3.4.1 MANUAL MODE

When in this mode, to start the operation, one has to select stream.

STREAM SELECTOR VER 2.01 MODE: MANUAL SELECTED PROBE N

N = data field (stream no 1 to 6)

Press 'Edit' key. The stream no. in data field will start flashing. Select the desired stream using Increment key. Press 'Enter' key, when desired stream is set. Display will stop flashing.

Now one can switch on the relay of the selected stream by pressing 'RUN' key. The display will show

```
        RUN MODE

MODE      :  MANUAL
PROCESS   :  RUN
 STREAM:  01   TIME: 0000
```

Once in 'RUN' mode, the relay of the selected stream will be ON. Page will display Selected Stream no. (01) and elapsed time for that stream. (Up counting).

The display will also show engineering value of analog input.

If analog output current monitoring is desired press PAGE key in RUN mode.

Analog output equal to input will be available at the output terminals of the selected stream (after completion of sample time) and at the output terminals of the common (tracking) channel.

Analog Output at other channels will be maintained to last Latch value.

3.4.2 AUTO MODE

When in stop condition, one can enter into Auto mode. When Auto mode is selected 'System will always starts from first stream.

If you want to start RUN, press 'RUN' key. The following sequence will be started:

Initially the display will show

```
        RUN MODE

MODE      :  AUTO
PROCESS   :  RUN
 STREAM:  01   TIME: 0000
```

Relay for running stream will be on, to allow the sample to flow in.

IN PULSE MODE

The system will wait for sync. Pulse from Analyzer to go high (+12V). As soon as Sync. Pulse goes high; the system will be in sample mode for the selected stream. Once in 'RUN' mode,.

The relay of the selected stream will be ON. Page will display Selected Stream no. (01) and elapsed time for that stream. (Up counting). When reach value of timer the relay for the selected stream is switched off.

Now the system will wait for sync. Pulse from Analyzer to go low. As soon as Sync. Pulse goes low; the system considers the stream to be in Analysis modeRelay for next un-skipped stream is switched on. Now the system will again wait for sync. Pulse from Analyzer to go high. As soon as Sync. Pulse goes high; the system considers the stream data is latched in selected stream. Cycle is repeated continuously until stop is pressed.

IN TIME MODE

If you want to start RUN, press 'RUN' key. The process will start from First stream. The relay for the running stream will be on. The programmed timer value will be displayed in the data field. It will start down counting and the remaining time value for the will be displayed in the Data field of the display.

When the timer value becomes zero. The currently selected stream relay will be switched OFF. The next stream timings will start. The cycle will go up to the last stream. Once cycle for last stream is executed, it will go to first stream.

If timer value is programmed as '0', the stream will be skipped.

One can terminate the sequence by pressing 'Stop' key. All the relays will be switched OFF.

If one wants to 'Pause' the process, he can press 'Pause' key. The timer stops advancing. The relay of the current stream is 'off'.

3.5 CALIBRATION MODE

One can perform calibration of analog input and Output thro' software using standard source and meter. To start calibration:

- Enter into calibration mode using Engineer's Password.
- Display will show a page:

CALIBRATION
INPUT CALIBRATION ←
OUTPUT CALIBRATION
DEF. OP CALIBRATION

Press PREV & NEXT key to move arrow, up and down. If enter key is pressed pages of

input calibration, output calibration & default output calibration are opened corresponding to the position of the arrow.

- In case of input calibration page following parameters will be displayed on the display after each depression of 'NEXT' or 'PREV' key.

  CALZERO 1 & CALSPAN 1
  CALZERO 2 & CALSPAN 2

- In case of output calibration page following parameters will be displayed on the display after each depression of 'NEXT' or 'PREV' key.

  OUTZERO 1
  OUTSPAN 1

  OUTZERO 2
  OUTSPAN 2

  OUTZERO 3
  OUTSPAN 3

  OUTZERO 4
  OUTSPAN 4

  OUTZERO 5
  OUTSPAN 5

  OUTZERO 6
  OUTSPAN 6

- In case of default calibration page display will be

DEF. OP CALIBRATION YES/NO

Pressing EDIT key and then Increment key, YES and NO will be displayed alternatively. Selecting YES, if Enter key is pressed Values for all analog output calibration settings will be initialized to default value.

- In case of default calibration page display will be

OUTPUT SET TO ZERO YES/NO

Pressing EDIT key and then Increment key, YES and NO will be displayed alternatively. Selecting YES, if Enter key is pressed Values for all analog output will be 4.00 ma values.

3.5.1 INPUT CALIBRATION

- Connect output of a standard 4-20 mA current source at the analog input terminals of the unit.
- Apply 4.00 mA input and monitor data displayed against parameter 'CALZERO1'.
- Press Edit Key & then Enter key to accept this as a zero reference.
- Now apply 20ma at the input.
- Select next parameter 'CALSPAN1'.
- Monitor display. When display is steady,
- Press Edit Key & then enter key. The displayed value will be stored as full scale reference.
- These zero and full scale values are stored in NVRAM.
- The input is linearly scaled between these two values.

3.5.2 OUTPUT CALIBRATION:

STREAM: 1

ZERO CALIBRATION:

- Connect a standard meter at the analog output terminals of channel 1.
- Apply 4.00 ma input.
- Select parameter 'OUTZERO1'.
- Monitor current output on the meter.
- Press Edit Key.
- It should be 4.00 mA.
- Use '↑' key to increase output.
- Use '→' key to decrease the output.
- Using these two keys to set the output at 4.00 mA and then press 'enter' key.

FULLSCALE CALIBRATION:

- Apply 20.00ma at input.

- Select parameter 'OUTSPAN1'.
- Monitor current output on the meter.
- It should be 20.00 mA.
- Press Edit Key.
- Use '↑' key to increase output.
- Use '→' key to decrease the output.
- Using these two keys to set the output at 20.00 mA and then press 'enter' key.

Calibration for output of other streams can be carried out using above procedure by selecting the respective parameters and monitoring their respective output terminals.

3.6 CURRENT (ANALOG) INPUT AND OUTPUT

The stream selector takes 4 to 20 mA as current input from Analyzer.

If system is in Run mode, sampled value for current input below INPUT is displayed in the run mode status page of the display.

To display hold analog current value, press PAGE key in run mode. It will display a page containing hold output current for six streams and press NEXT key for the value of seventh stream.

There are six channels of Analog output. Their output is from of 4.00 to 20.0 mA. These are sample & hold type outputs.
Output of a particular Analog output channel is updated according to output updation type. If output updation type is 'continuous' Output of a particular Analog output channel is updated continuously after setting delay time and when it is' On stream change 'Output of a particular Analog output channel is updated after sampling for that particular stream is completed after setting delay time.
When stream is change over before setting value of no sample time output channel is no updated

CHAPTER 4

4.2 Terminal Details

This is back panel terminal details. Terminal no. and the signals terminated on each terminal are given. This detail is useful for interfacing/ Panel wiring.

1	RLY-6 NO	RELAY OUTPUTS
2	RLY-5 NO	
3	COMMON-2	
4	RLY-4 NO	
5	RLY-3 NO	
6	RLY-2 NO	
7	RLY-1 NO	
8	COMMON-1	
9	Dig. I/P- 4	DIGITAL INPUTS
10	Dig. I/P- 3	
11	Dig. I/P- 2	
12	Dig. I/P- 1	
13	COMMON	
14	Chan 1 +	Analog Outputs: 4 to 20mA
15	Chan 1 -	
16	Chan 2 +	
17	Chan 2 -	
18	Chan 3 +	
19	Chan 3 -	
20	Chan 4 +	
21	Chan 4 -	
22	Chan 5 +	
23	Chan 5 -	
24	Chan 6 +	
25	Chan 6 -	
26	Chan 2 +	Ana Inputs 4 to 20mA
27	Chan 2 -	
28	Chan 1 +	
29	Chan 1 -	

4.3Serial communication

This system has Facilities of serial RS 232 OR RS 485.