



इ रि से ट
विद्युत सिग्नल प्रयोगशाला
प्रयोग नं: ई एस एल -42

IRISET
ELECTRICAL SIGNALLING LABORATORY
EXPERIMENT NO.: ESL – 42

नाम

Name : _____

अनुक्रमांक

Roll No : _____

पाठ्य क्रम

Course : _____

दिनांक

Date : _____

प्राप्त अंक

Marks Awarded : _____

अनुदेशक का अधाक्षर

Instructor Initial : _____

STUDY OF EFFTRONICS DATALOGGER – 99/2006 Model
(IRS: S-99/2006)

Datalogger is a Microprocessor based system, which helps in analysing the failures of relay interlocking system. This is like a black box, which stores all the information regarding the changes taking place in relays and voltages with date and time stamp. The same information/data can be transferred to the computer to analyse further "on line" analysis of stored data. Hence preventive maintenance can be achieved. A printed copy of the logged reports also can be obtained through a dot matrix printer.

Hardware (Equipment):

Datalogger system consists of:

- i) Datalogger (CPU - with Microprocessor 68000)
- ii) Digital input cards.
- iii) Dual modem card.
- iv) Digital Scanner units / (DSU)
- v) Analog Scanner units / (ASU)

CPU Card:

It is provided with Motorola microprocessor M 68000, working at a speed of 20 MHZ. It performs all the activities pertaining to the datalogger i.e., scanning of digital signals (Relay operations) for every 16-milli seconds and scanning of analog signals (i.e. AC/DC voltages & DC currents) for less than 1 second.

This card is provided with 2X24 alphanumeric LCD (Liquid Crystal Display), Key Board, LED Matrix Display and a Real Time Clock.

LCD display and keyboard will act as man machine interface (MMI) between the data-logger and the signal engineer. All the operations can be performed using this LCD and keyboard.

Real time display with 7 Segments: This is a built in real time clock within Datalogger and its current time will be displayed on the 7-segment display provided.

Display Card RESET Button is provided for refreshing of display when the display is hanged. Resetting display does not have any effect on the operation of the CPU module

CPU card continuously scans (checks) the DSUs and ASUs. Each input connected to digital scanner units is optically isolated by Opto couplers. When CPU card scans the digital inputs, it compares with the previous stored data and if there is any change from the previous status then only that data will be stored (the status / conditions of relay) with date and real time. A total of 10 Lakhs events can be stored in flash memory. There is no loss of data from datalogger memory in case of power supply failure of datalogger.

Digital input cards (in-built):

This system is having maximum 8nos. of inbuilt Digital inputs cards. Maximum 64nos. of digital inputs can be connected to each digital input card. The potential free relay contact, may be front or back contact, terminated at the Tag Block from the relay of signals, tracks, points, Buttons etc. and are subsequently connected to Digital input cards through Flat Ribbon Cable (FRC) connectors. These in-built digital input cards can monitor a total 512 nos. of relays status. It is expandable up to 4096 digital inputs.

Digital Scanner Unit (DSU):

Each DSU contains 8 nos. of Digital Input cards. Each input card can be connected with 64 inputs. Total input capacity of one DSU unit is 512 inputs. These scanner cards contain Opto couplers and Multiplexers. Inputs are connected to Intermediate tag block and then to Digital tag block. The Digital tag blocks are connected to DSU through FRC (Flat ribbon cable) connectors. Maximum 7 nos. of DSUs can be connected to the system. Digital input capacity of the system is 4096. All these digital inputs are scanned at rate of 16m.sec.

Analog Scanner Unit (ASU):

Analog Scanner Unit is provided in the analog euro rack. It has two cards.

Card 1: Analog scanner card with controller, which supports 1-8 channels.

Card 2: Analog scanner card without controller, which supports from 9-16 channels.

Each input card can be connected with 8nos. of Analog channels. Total input capacity of the ASU is 16 analog input channels. Maximum 6nos. of ASUs can be connected to the system. Analog input channel capacity of the data logger system is 96. All these analog inputs are scanned at a rate of less than 1 sec.

CPU Module has 16 ports for serial communication, out of which:

- 3 ports are dedicated to Display card, Serial printer and Memory card.
- 4 ports are generally used as Answering modem **port**, Originating modem **port** , T- Network port and Debugger port.
- 6 ports are used for connecting Analog Scanner Cards.
- 3 ports are used for connecting to Remote Terminal Units/Electronic Interlocking system/Point machine/IPS.

Non vital Relay controls:

It is possible to control 8 miniature relays through commands from CMU. These relay contacts which are terminated on the Adapter PCB of data logger can be used for controlling the power equipment, generating alarms etc.

Power supply:

Normally 24V DC supply with battery backup is required for the system working. Voltage at Datalogger Input terminals shall be 24 to 28V DC.

If IPS is available power supply of Data logger may be taken from IPS. When DC – DC converter is connected, ensure that the 24 V DC supply wires connected between the DC – DC converter output terminals and the Data logger terminals are not run parallel to other power supply wires. There shall be no joints in the power cable. Separate DC – DC converter module shall be used exclusively for data logger. Rating of DC – DC Converter shall be 5 A up to 1024 inputs, 10 A for 1025 to 2048 inputs and 15 A for 2049 to 4096 inputs.

Data logger Earth:

The earth connectivity cables are to be connected for protecting the data logger with 10 sq.mm multi strand copper cable. It shall be connected between the Data logger Euro rack to earth terminal in the room. Within the Euro rack of the Data logger, connectivity between Data logger euro rack and the frame is to be ensured. Ensure that the earth resistance is less than 2 Ω . Ensure that the Quad cable (where provided) armor and screen are earthed.

Networking of Data loggers:

The individual data loggers can be inter connected in a network in daisy network fashion.. The data logged by all the data loggers connected in a network can be collected and stored in a Central Monitoring Unit located at a central location like a divisional head quarters.

Components of a Data logger Net work :

- 1) Data loggers/RTUs of individual locations
- 2) Communication Modems
- 3) Transmission Medium(OFC/Quad cable /Microwave)
- 4) Front End Processor
- 5) Central Monitoring Unit (CMU)

Modems:

Modems are used for data transfer between data loggers and between data loggers and FEP. Modems are configured to RS 232 Serial communication.

In Data logger Network two types of 4-wire line modems are used:

- Internal modem. (Dual modem card)
- External Modem. (Single modem)

Functionally there is no difference between these modems.

Internal modem card / Dual Modem card (in-built):

It is fixed in datalogger Euro rack itself. One card contains two modems. The top modem is called ANS (answer) modem and the bottom modem is called as ORG (originate) modem.

Note: In case of networking of dataloggers, connect 'ANS' modem to the 'ORG' modem of one adjacent station and connect 'ORG' modem to the 'ANS' modem of other adjacent station.

Indications on Dual modem card

LED	DESCRIPTION	NORMAL STATE	FAILURE STATE
CTS	CLEAR TO SEND	ON when Modem is in link	OFF when Modem is not in link
CD	CARRIER DETECT	ON when Modem is in link	OFF when Modem is not in link
RD	RECEIVE DATA	Blinking when data is received	OFF when data is not transferring
TD	TRANSMIT DATA	Blinking when data is Transferred	OFF when data is not receiving
OH	OFF HOOK	ON Always	OFF modem hang
AA	AUTO ANSWER	ON Always(for Originating Modem it is always OFF)	OFF modem not working
RTS	REQUEST TO SEND	ON Always(for Originating Modem it is always OFF)	OFF (DTE signal problem between DL processor to modem)
DTR	DATA TERMINAL READY	ON Always(for Originating Modem it is always OFF)	OFF modem not working
HS	HIGH SPEED	ON Always(for Originating Modem it is always OFF)	OFF when line speed is below 9600 bps

CD (Data Carrier Detect) LED is normally 'ON' and it's 'OFF' state indicates that the Modem is not in link at the other end.

'TD' (Transmit Data) and 'RD' (Receive Data) LED's will frequently blink indicating the proper data transfer and receiving condition.

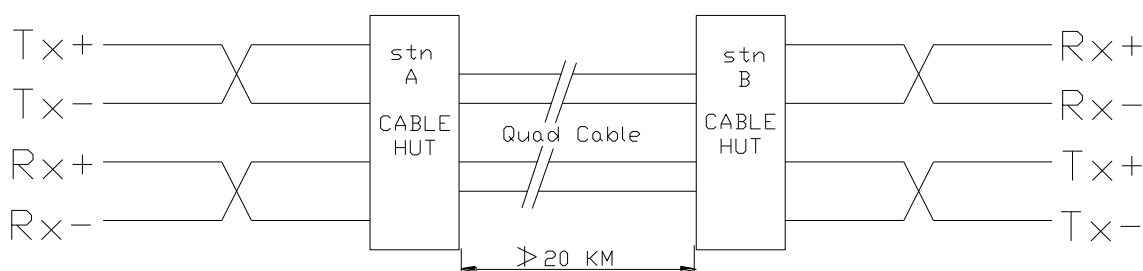
'OH' (Off Hook) LED should be normally 'ON' and it's 'OFF' state indicates that the Modem is in Hang condition. Modem should be reset in that condition

External modems:

These are generally used at FEP (Front End Processor) side to connect the data loggers. These modems can be connected to data logger through a T Network port

- To transfer Data from one datalogger to another datalogger / FEP Baud rate is 57,600bps.
- To transfer the data from FEP to CMU (PC) the Baud rate is 1,52,000 bps.

Data Logger of one Station to Datalogger of other Station Cable connections:



Input requirements:

Relay inputs (digital inputs) and analog inputs (voltages, currents etc.,) are required to be connected to the system as per the requirements of RRI / PI / SSI as the case may be.

Some of the inputs to be monitored is given below:

Digital inputs:

Field inputs:

All TPRs, NWKR, RWKR, ECR, Crank Handle relays, Siding, Slot, LC gate control relays etc.,

Control Panel inputs:

All button / Knob relays, SM key.

Internal relays:

British system:

All HR, DR, HHR, WNR, WRR, ASR, UCR, RR, LR, UYR, TLSR, TRSR, TSR, JSLR, JR, etc.,

SIEMENS system:

Z1UR, Z1UR1, GZR, ZDUCR, ZU(R)R, ZU(N)PR, G(R)R, G(N)R, U(R)S, U(N)PS, UDKR, DUCR, U(R)LR, UYR1, UYR2, G(R)LR, GR1, GR2, GR3, GR4, OVZ2U(R)R, W(R/N)R, (R/N)WLR, Z1NWR, Z1RWR, Z1WR1, WKR1, WKR2, WKR3, etc.,

Other Inputs:

- 1) IPS failure alarm inputs
- 2) EI system inputs
- 3) Relay room door opening logic

Analog channels:

230 V AC (Input power supplies in the power panel),
 110 V AC (Output of Signal and Track transformers),
 110V DC (For Point operation),
 60V DC (For Siemens relays),
 24V DC (For Q-series relays),
 24V DC (For Block, Axle counters),
 12V DC (For indications)

FEP (Front End Processor):

It consists of CPU card, Internal modem card, LED indications for status of modems, 7-Segment LED display, Display card Reset button, LCD display and Key pad. It works on 24V DC. It draws 1.6A continuous current when all the three modems are connected. Normally it shows the number of packets pending and to be sent to the computer on its 7-segment LED display. It has 4-nos. of RS-232 communication ports such as COM1, COM2, COM3 and COM4. Multi-port FEP has 10 nos. of RS-232 com ports. COM1 is used for Fault Analysis System (FAS) i.e. Remote Monitoring Unit (Computer) connection. COM2, COM3 & COM4 are used for networking. For Bi-directional 2- nos. of ports and for Tri-directional (T-network) 3-nos. of ports are used.

Study the systems installed in the ESLab and answer the following:-

- 1) List out the components of the data logger system?
- 2) How many inputs can be connected to each digital input card?
- 3) How many inputs can be connected to each ASU?
- 4) Explain how modem resetting is done through the key pad of data logger system ?
- 5) What is the arrangement required for connecting the systems to Network?

6) Draw the Functional diagram of Data logger Network.

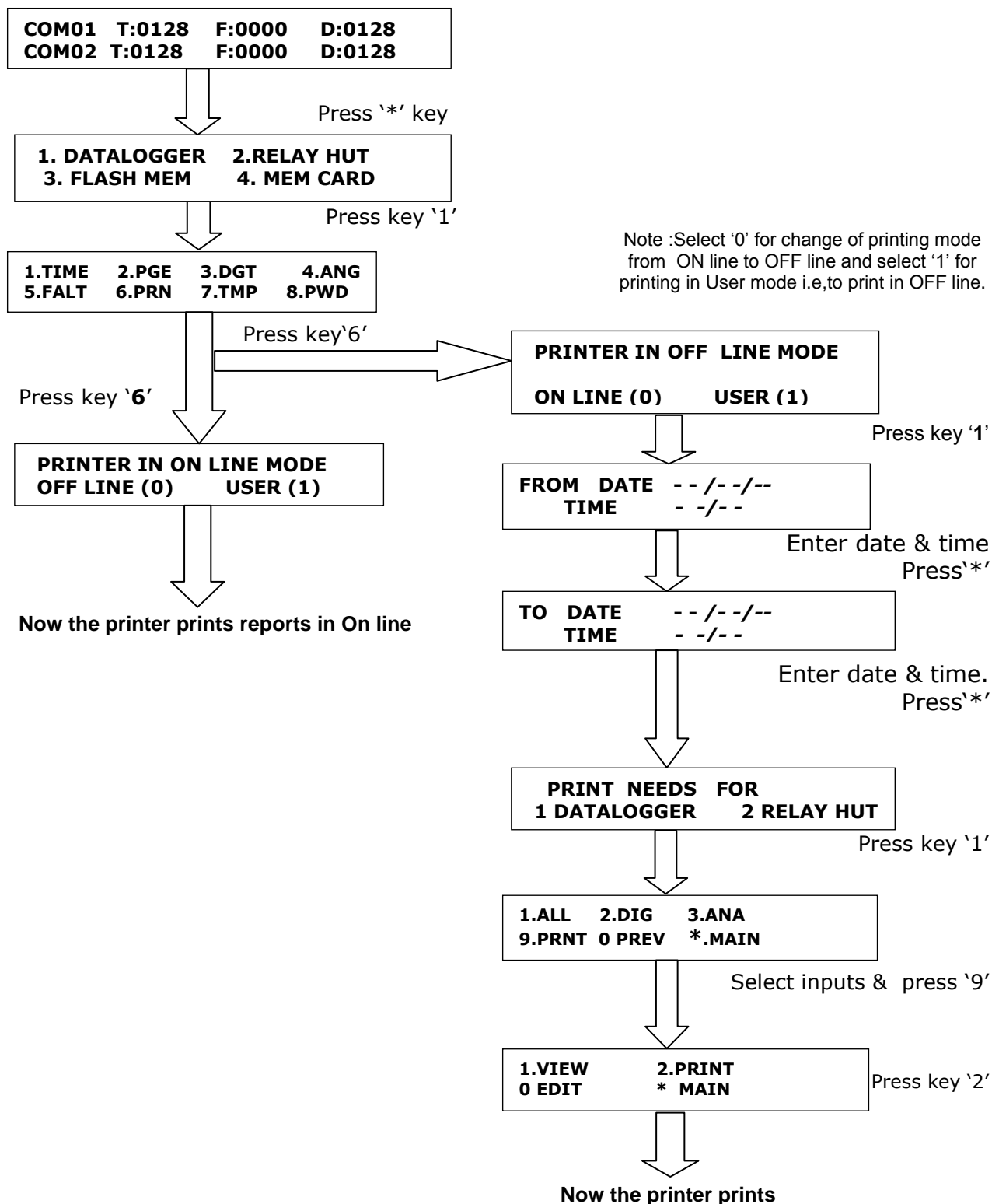
7) Hands on practice:

Do the practice in the lab for taking the digital reports for a selected date & time

A. Procedure for taking print out of Data logger reports :

The print out of data logger reports in On line/Off line mode can be obtained by the following procedure. Connect the printer and switch on the printer with a paper inserted in it

The default display in the LCD of data logger is



the selected Off line reports

B. PROCEDURE FOR CHANGING DATE & TIME OF DATA LOGGER :

Go to data logger option. Now the following screen will appear on the LCD.

1. TIME	2.PGE	3.DGT	4.ANG
5. FALT	6.PRN	7.TMP	8.PWD

Press key '1', then following screen will appear on the screen.

TIMESET	DATE	DD / MM / YYYY
TIME		HH : MM : SS

By pressing any key to change the time the following screen will appear.

ENTER PASSWORD:
- - - - -

Now enter the password. By default the password is '123456'.

If user enters the correct password the following screen will appear.

TIMESET	DATE	DD / MM / YYYY
TIME		HH: MM: SS

Now update the required date and time in the fields given in the above screen. To move the cursor between the fields press the key '#'.

Now after updating the above fields, press the key '*'. Then the following screen will be appeared.

SET TIME...	YES (#) NO (*)
--------------------	-----------------------

Press the key '#' for effecting the changes, press '*' key for canceling the changes made in the above fields. When the '#' key is pressed then the following screen will appear on the LCD

TIME UPDATED...
MAINMENU (*)

Press '*' key to return back to Default Display Menu.

Date :

Signature of the Trainee