नाम **Name** _____	
अनुक्रमांक **Roll No.** _____	**प्राप्त अंक Marks Awarded**
पाठ्यक्रम **Course** _____	
दिनांक **Date** _____	**अनुदेशक का अध्याक्षर Instructor Initial**

Study of Pimary Digital Multiplexing equipment (Make PUNCOM, Model VMX-0100)

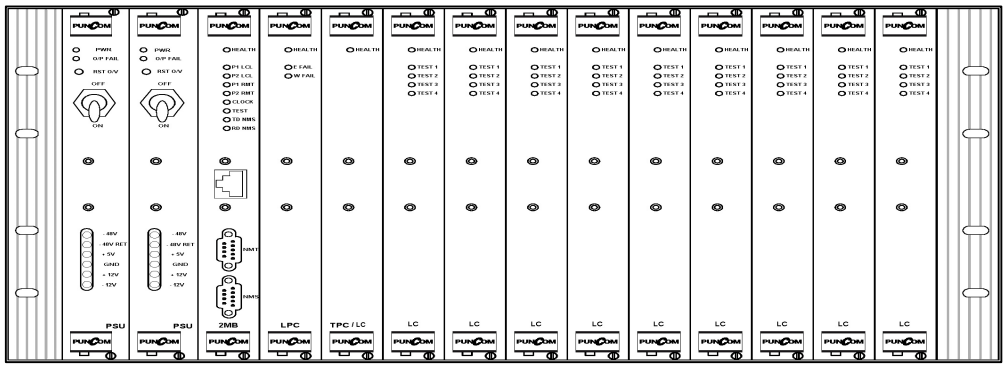
OBJECTIVE: After completion of this experiment, trainees are able to identify the cards and understands their functionality, pin configuration and also the wiring from cards to terminations (KRONE), practices setting up of MUX-ID through DIP switch.

Description: The PUNCOM VMX-0100 is 2Mbps, 30 Channel E1, highly flexible Add-Drop Multiplexer that provides full range of voice and digital data services to subscribers located at different locations, requiring to interconnect and establish a voice and data network over an E1 link. With variety of features & user interfaces, it can full fill versatile voice & data communication needs. The design of VMX-0100 is modular and most user interfaces come with a modularity of four channels per card.

VMX-0100 supports two standard E1 PCM trunks. The VMX-0100 used as end terminals are configured to have one PCM trunk whereas the intermediate terminals in a drop / insert network have two PCM interfaces, for two directions. Both PCM trunk interfaces are however completely and independently programmable and can be configured if required to support two entirely independent PCM trunks going in different directions.

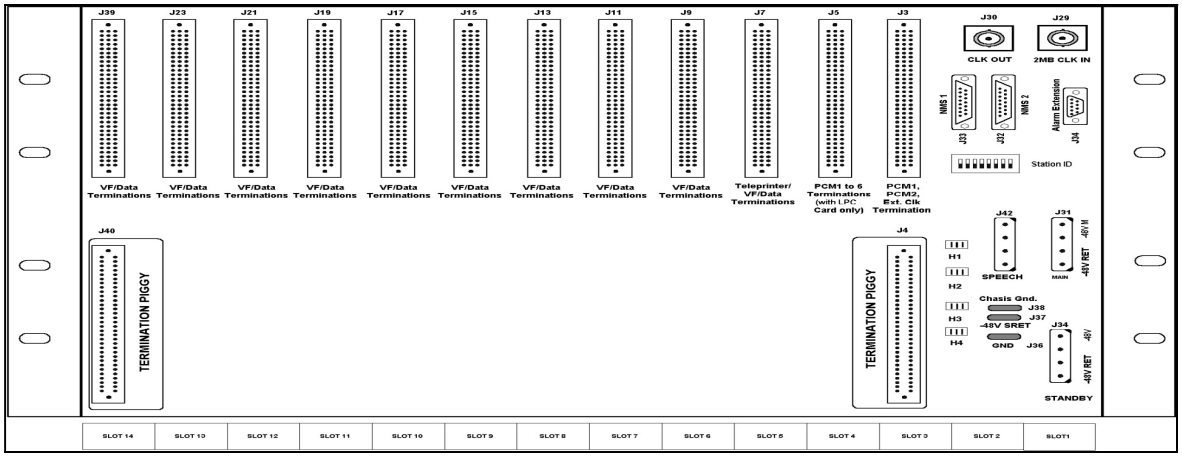
SHELF ARRANGEMENT

VMX-0100 shelf fitted with a motherboard has a provision for 14 slots. The slots are numbered 1 to 14 as seen from left to right. The slot configuration is as under:



Front View of VMX-0100

Slot 1	Power Supply (PSU) Card
Slot 2	Redundant Power Supply (PSU) Card
Slot 3	TME (Two Mb Ethernet) Card
Slot 4	Loop Protection (LPC) Card (Optional)
Slot 5-14	User Interface Card



Rear view of VMX-0100

CARDS : The design of VMX-0100 is modular and is based on multiple processors. Broadly VMX-0100 system can be partitioned as follows:

1. **Common Cards**
   - PSU Card
   - TME Card
2. **Optional Cards**
   - LPC Card
3. **User Interface Cards**

a) <u>VF Cards</u>
E & M Card
FXO Card
FXS Card

b) <u>Data Cards</u>
G703 Card
UDT Card
N64 Card
TPC Card
UIF Card .
FE1 Card
UDT Card

Functional description of cards:

1. **PSU Card: Power** Supply in the VMX-0100 is DC-DC converter based on SMPS technology. VMX-0100 supports optional redundant PSU Card for higher availability. The two modules go in slot 1 & slot 2 of the motherboard. Apart from generating the output voltages required for the functioning of the system, it also generates the 75V rms, 25Hz. ring signal required for the FXS card. The input output specifications are as under:

   Input:: -36 V to -72V (-48V nominal)
   Output:: +5V/10 Amp
   +12V/1.05 Amp
   -12V/1.05 Amp

   A filtered -48V given to loop signaling VF Cards for powering the VF Loop interfaces.
   Typical power consumption of VMX-0100 is 75W.

2. **TME (Two Megabit Ethernet) Card**: goes in slot no. 3 of the VMX-0100 Shelf. This is a microprocessor-based card employing Motorola's MC68EN302 Microprocessor and functions as the overall controller of VMX-0100. It implements all programmable features of the mux, scans the mux for alarm conditions, maintains history files as well as takes the user defined action whenever the alarm condition is detected. It also scans the mux hardware for correct functioning and signals the user whenever any abnormality is seen.

This implements full featured cross connect between PCM1, PCM2 trunks and the local user ports. It also functions as the signaling processor card and extracts the signaling information coming on time slots 16 of PCM 1 and 2 and sends them to the VF ports and vice versa. It houses the clock handing logic & PLL. It also interacts with the Network management System either through Rs-232 or Ethernet interface for providing Network Monitoring & Control.

3. **LPC Card:** LPC stands for Loop Protection card. The primary goal is to protect the main link through a protection path. This Card is used to protect the P1 & P2 streams carrying the traffic in case of any major failure in the network. It provides the protection to the main 2Mb stream in a manner that all nodes on the chain remain connected to each other on the omnibus channels. It uses two 2Mb streams one spare & one backup for providing the protection.

4. USER INTERFACE CARDS

VF & data Interfaces

a) E&M card is used for 2W & 4W interfaces. E&M card is primarily used for control communication in Railways. Omnibus circuits can be made in this card only. Point to point circuits can also be made in this card. This voice line card supports up to 4 E&M channels for interconnecting analog telephone switches and setting up conference circuits. 2W / 4W interface is soft selectable.

b) FXS Required for Loop I/C and Exchange Line interfaces.This card can be used in Subscriber mode (for extending numbers) & Hotline mode. For hotline mode, FXS card need to be there at both ends.

c) FXO Required for Subscriber, Loop O/G and Hot Line interfaces. This card is used for feeding numbers from exchange side. At the other station, FXS needs to be there.

d) Hot Line Interface is used between two subsribers This card provides 4 channels of 2 wire Exchange interface for remote subscriber applications. It can be configured as 2 wire Loop incoming interface for connecting junction / tie lines.

e) G703 Card: Required for 64Kbps G.703 Co-directional Data

f) UDT Card: Required for 1200/2400/4800/7200/9600/19200 baud synchronous or asynchronous data.

g) N64 Card: Required for Nx64 data where N_{max}=30

h) TPC Card: Required for 50/100 baud Teleprinter Data on spare bits.

i) UIF Card: Required for 64/128K Data Extension to remote sites.

j) FE1 Card: Required for supporting two Fractional E1 streams

Interfaces on TME card:

(a) NMT DB9 Connector Details

PIN NO.	SIGNAL NAME	SOURCE
1.	CD	NMT
2.	RXD	NMT
3	TXD	VMUX0100
4.	DTR	VMUX0100
5.	GND	COMMON
6	DSR	NMT
7	RTS	VMUX100
8	CTS	NMT
9	RI	VMUX0100

(b) NMS DB9 Connector Details

PIN NO.	SIGNAL NAME	SOURCE
1.	NC	
2.	RXD	
3	TXD	VMUX0100
4.	NC	
5.	GND	VMUX0100
6	NC	
7	NC	
8	NC	
9	NC	

Termination Signal Details

When installed in designated slot (slot No 2), the terminations are available on the various connectors available on the rear of the motherboard. The signal detail of these connectors is as under:

Connector Designation : J3
Connector Type : 64-pin Euro male TME CARD

PIN	A	C	PIN
1.	-------	--------	1
2.	PCM1 IN (A)	PCM1 OUT (A)	2
3.	GND	GND	3
4	PCM1 IN (B)	PCM1 OUT (B)	4
5	GND	GND	5
6	PCM2 IN (A)	PCM2 OUT (A)	6
7	GND	GND	7
8	PCM2 IN (B)	PCM2 OUT (B)	8
9	------	-------	9
10	EXT. CLOCK IN (A)	EXT. CLOCK OUT (A)	10
11	GND	GND	11
12	EXT. CLOCK IN (B)	EXT. CLOCK OUT (B)	12
All other pins should not used			

Connector Designation: J34
Connector Name: Alarm Extension
Connector Type: DB 9F

PIN	SIGNAL
1.	-48V IN
2.	MJR_NC
3	MJR_C
4.	MJR_NO
5.	GND
6.	MIN_NC
7.	MIN_C
8	MIN_NO
9.	GND

Connect alarm cable from Bay Top Panel to equipment using 6-Pin Wafer connectors provided on the rear panel.

Connector Designation: J32,J33
Connector Name: NMS
Connector Type: DB 15 F

PIN	SIGNAL
1.	GND
2.	NMS TXA
3	NMS RXA
4.	--------
5.	------
6	-------
7	GND
8.	------

PIN	SIGNAL
9	NMS TXB
10	NMS RXB
11	NMS RXA
12	PP5V
13	---------
14	-------
15	--------

Connector Designation : J31 , J43
Connector Name: Power Input
Connector Type: 4-pin Male

PIN	SIGNAL
1	-48V IN
2.	-48V IN
3	-48RET
4.	-48RET

Connect power cable from Bay Top Panel to equipment using 4-Pin Power connectors provided on the rear panel (The mating plugs are pre installed on rear panel). The power input terminal is located on the right hand side of rear panel.

Connector Designation: J5
Connector Type: 96-pin Euro male
LPC CARD

PIN	A	C	PIN
1.	-------	--------	1
2.	PCM1 IN (A)	PCM1 OUT (A)	2
3.	GND	GND	3
4	PCM1 IN (B)	PCM1 OUT (B)	4
5	GND	GND	5
6	PCM2 IN (A)	PCM2 OUT (A)	6
7	GND	GND	7
8	PCM2 IN (B)	PCM2 OUT (B)	8
9	-----	-------	9
10	PCM3 IN (A)	PCM3 OUT (A)	10
11	GND	GND	11
12	PCM3 IN (B)	PCM3 OUT (B)	12
13	GND		13
14	PCM4 IN (A)	PCM4 OUT(A)	14
15	GND	GND	15
16	PCM4 IN (B)	PCM4 OUT(B)	16
17	--------	---------	17
18	PCM5 IN (A)	PCM5 OUT(A)	18
19	GND	GND	19
20	PCM5 IN (B)	PCM5 OUT(B)	20
21	GND	GND	21
22	PCM6 IN (A)	PCM6 OUT(A)	22
23	GND	GND	23
24	PCM6 IN (B)	PCM6 OUT(B)	24
25	-------	-------	25
All other pins should not used			

Connector Designation : J7,9,11,13,15,17,19,21,23,39
Connector Type : 96-pin Euro male **E&M Card**

PIN	A	C	PIN
1.	-------	--------	1
2.	2W/4W RX1 A (OUT)	2W/4W RX1 B (OUT)	2
3.	4W TX1 A (IN)	4W TX1 B (IN)	3
4	E1	M1	4
5	2W/4W RX2 A (OUT)	2W/4W RX2 B (OUT)	5
6	4W TX2 A (IN)	4W TX2 B (IN)	6
7	E2	M2	7
8	NC	NC	8
9	------	-------	9
10	2W/4W RX3 A (OUT)	2W/4W RX3 B (OUT)	10
11	4W TX3 A (IN)	4W TX3 B (IN)	11
12	E3	M3	12

13	2W/4W RX4 A (OUT)	2W/4W RX4 B (OUT)	13
14	4W TX4 A (IN)	4W TX4 B (IN)	14
15	E4	M4	15
16	NC	NC	16
17	-------	-------	17
All other pins should not used			

Connect VF cables from Main Distribution Frame (MDF) to equipment using Dual 2 X 7 Round cable connector. The cables should be connected to corresponding slots on the MDF and equipment (Slot numbers are also written on VMX as well as MDF for identification purposes

Connector Designation : **J7,9,11,13,15,17,19,21,23,39**
Connector Type : 96-pin Euro male

FXO CARD & FXS CARD

PIN	A	C	PIN
1.	-------	--------	1
2.	TIP1	RING	2
3.	NC	NC	3
4	NC	NC	4
5	TIP2	RING2	5
6	NC	NC	6
7	NC	NC	7
8	NC	NC	8
9	------	-------	9
10	TIP3	RING3	10
11	NC	NC	11
12	NC	NC	12
13	TIP4	RING4	13
14	NC	NC	14
15	NC	NC	15
16	NC	NC	16
All other pins should not used			

SETTING OF EQUIPMENT ID: An 8-position DIP switch has been provided on the rear side of motherboard to set the equipment ID. With 8 positions maximum of 256 IDs can be set. This ID is required for the NMS operation & forms the address of the NMS basic frame.

Review questions:

1. Draw the DIP switch position for a station code of 25

SIGNATURE OF THE TRAINEE