Chapter
1

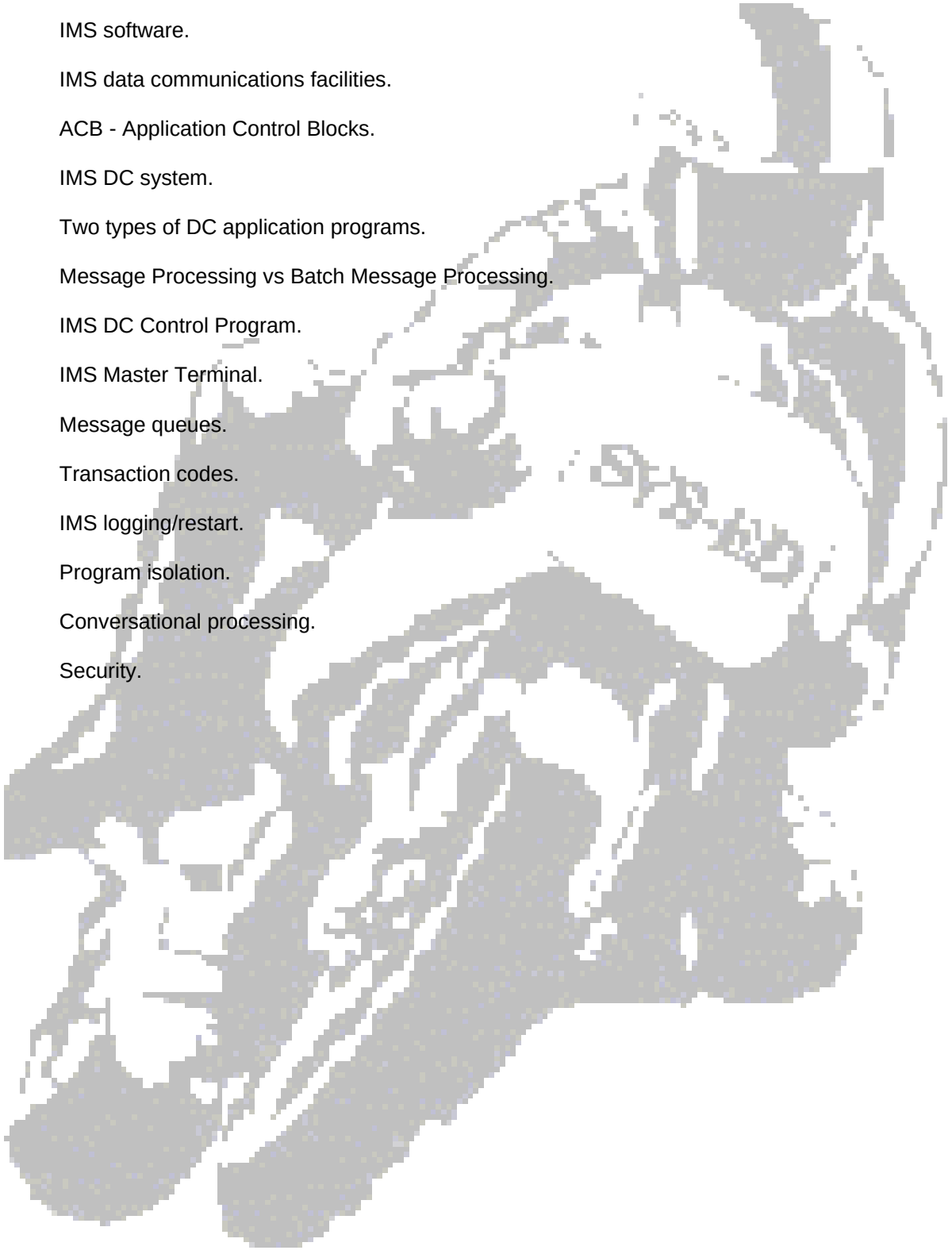
THE IMS DC SYSTEM

SYS-ED/
COMPUTER
EDUCATION
TECHNIQUES, INC.

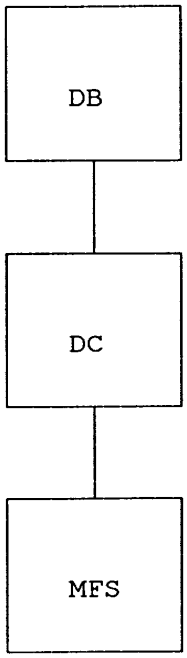
Objectives

You will learn:

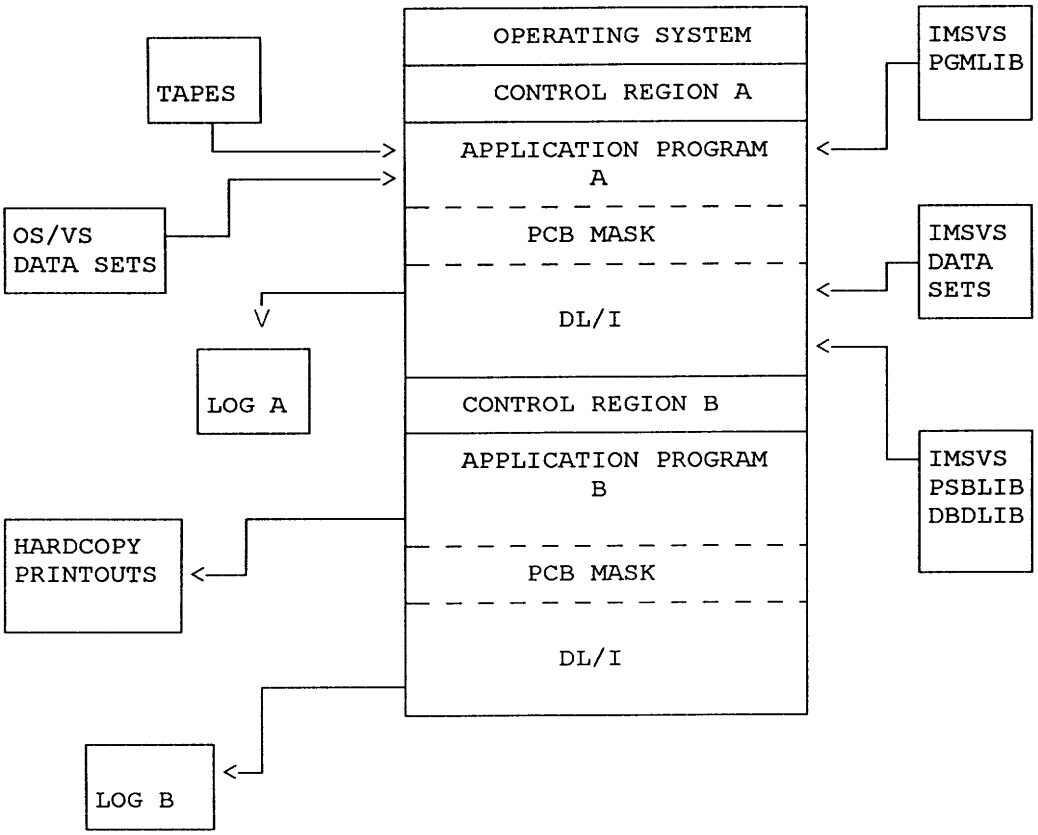
- IMS software.
- IMS data communications facilities.
- ACB - Application Control Blocks.
- IMS DC system.
- Two types of DC application programs.
- Message Processing vs Batch Message Processing.
- IMS DC Control Program.
- IMS Master Terminal.
- Message queues.
- Transaction codes.
- IMS logging/restart.
- Program isolation.
- Conversational processing.
- Security.



1 IMS Software



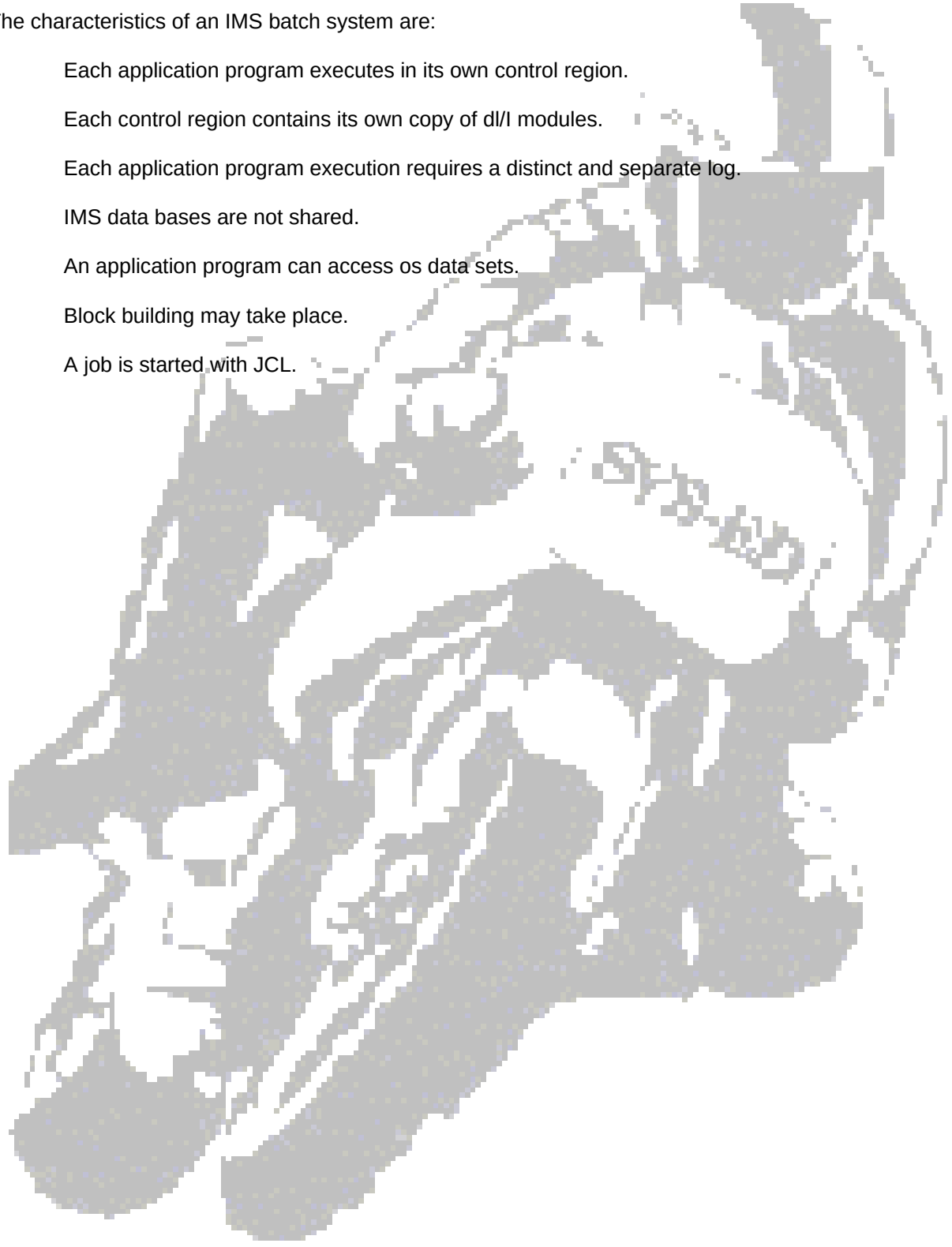
2 IMS Batch System Overview



3 IMS Batch System

The characteristics of an IMS batch system are:

- Each application program executes in its own control region.
- Each control region contains its own copy of dl/I modules.
- Each application program execution requires a distinct and separate log.
- IMS data bases are not shared.
- An application program can access os data sets.
- Block building may take place.
- A job is started with JCL.



4 IMS Batch JCL

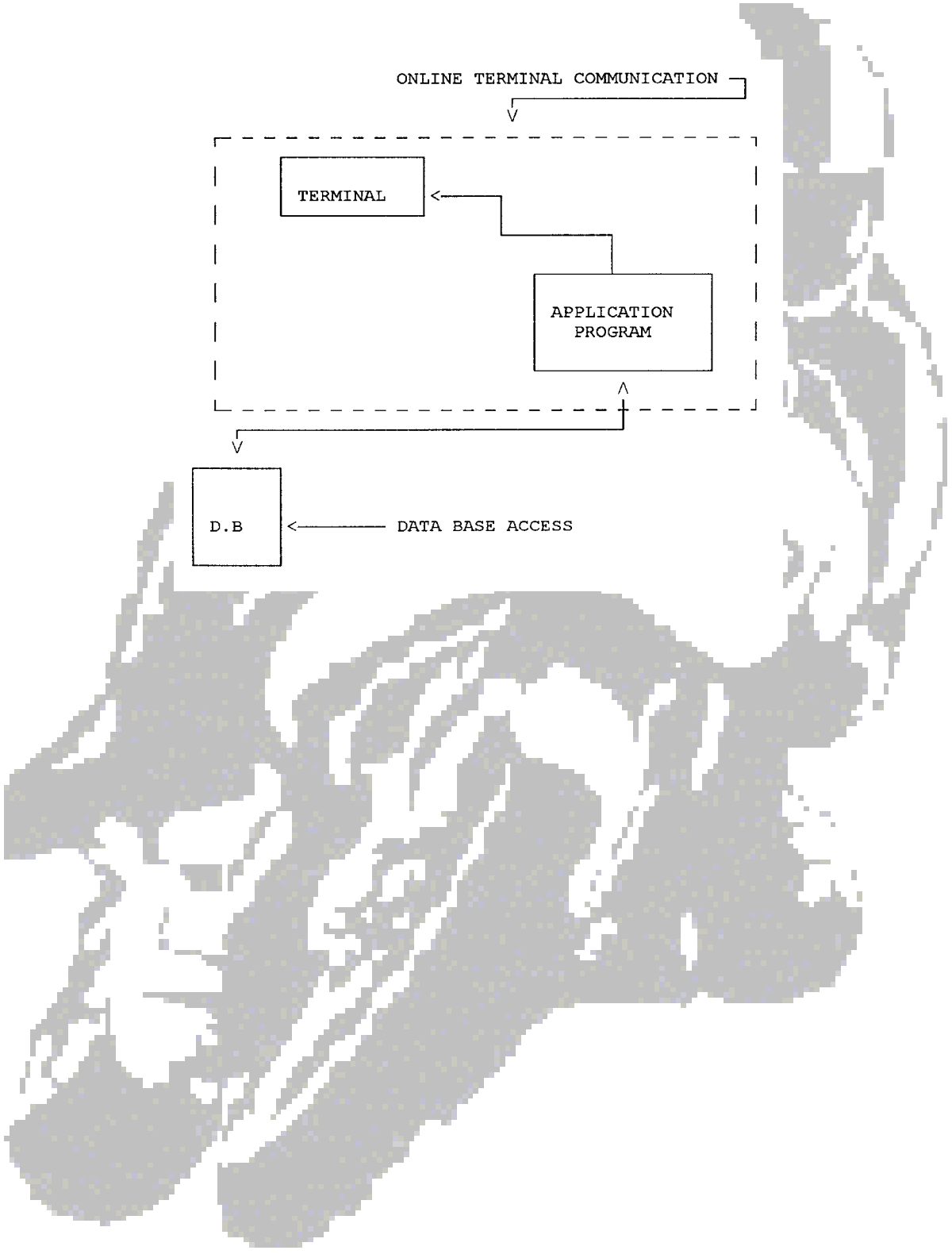
//JOB
//JOBLIB DD DSN = IMSVS.PGMLIB,DISP = SHR
//EXEC PGM = DFSRRCOO, REGION = 256K,
	Own control region.

//PARM =`DLI, APPL1, PSBA'
//IMS DD DSN = IMSVS.PSBLIB, DISP = SHR
// DD DSN = IMSVS.DBDLIB, DISP = SHR
	No block building.

OR

//PARM =`DBB, APPL1, ACBA'
//IMS DD DSN = IMSVS. ACBLIB, DISP =SHR
//IEFRDER LOG TAPE)> OWN LOG TAPE
//DFSVAMP VSAM BUFFERS
// DATA BASENAMES
.
.
.
// OS DATA SETS
	Block building.

5 IMS Data Communications Feature

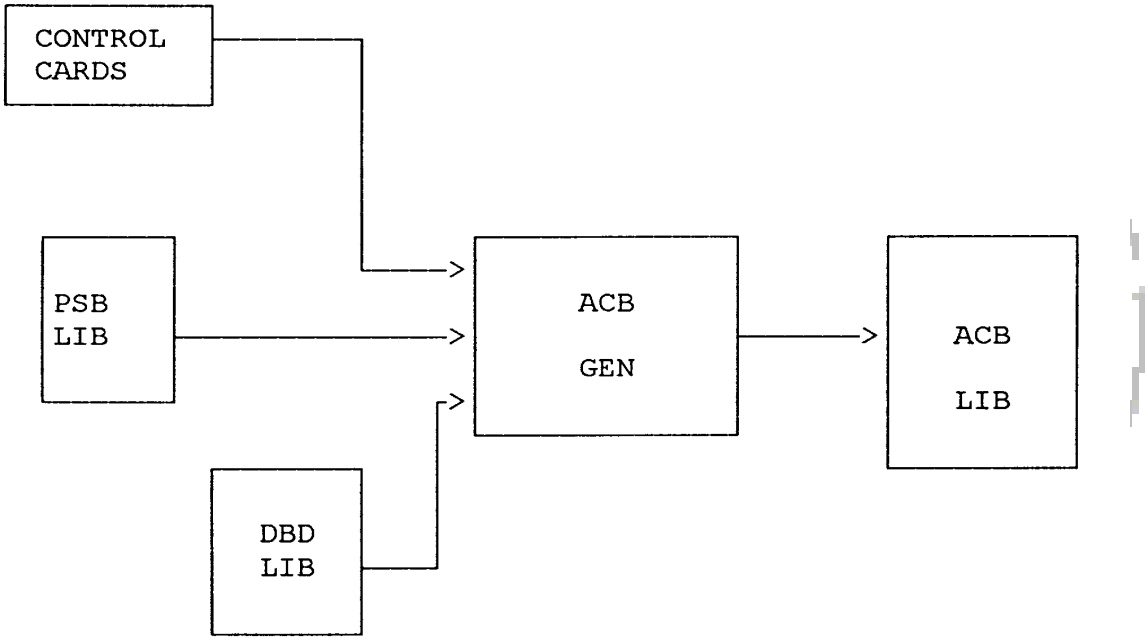


6 ACB Application Control Blocks

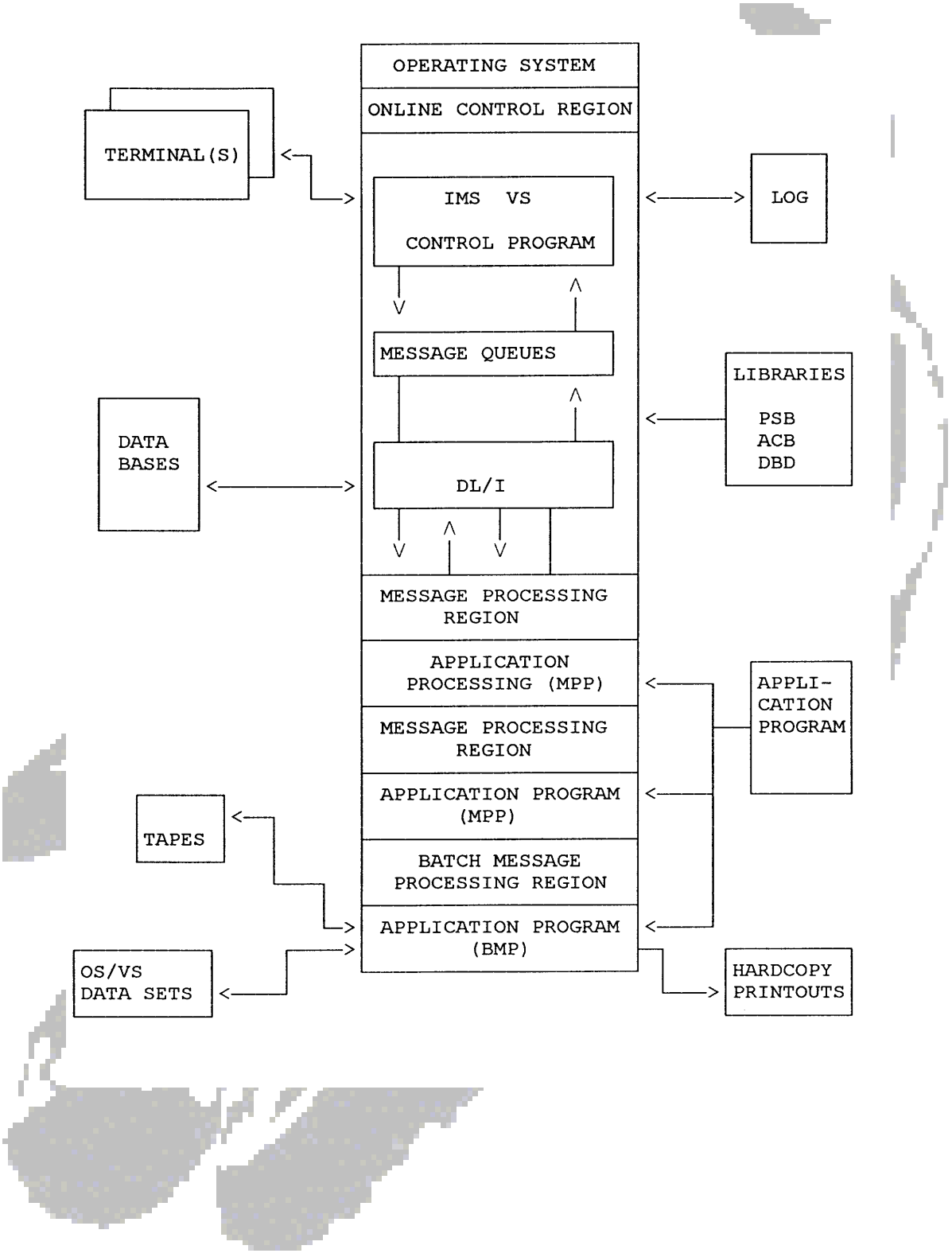
ACB generation builds control blocks from the PSB and its associated DBD's.

Output of ACB generation is pre-assembled control blocks, ready to be loaded into memory.

ACB is required for online execution.



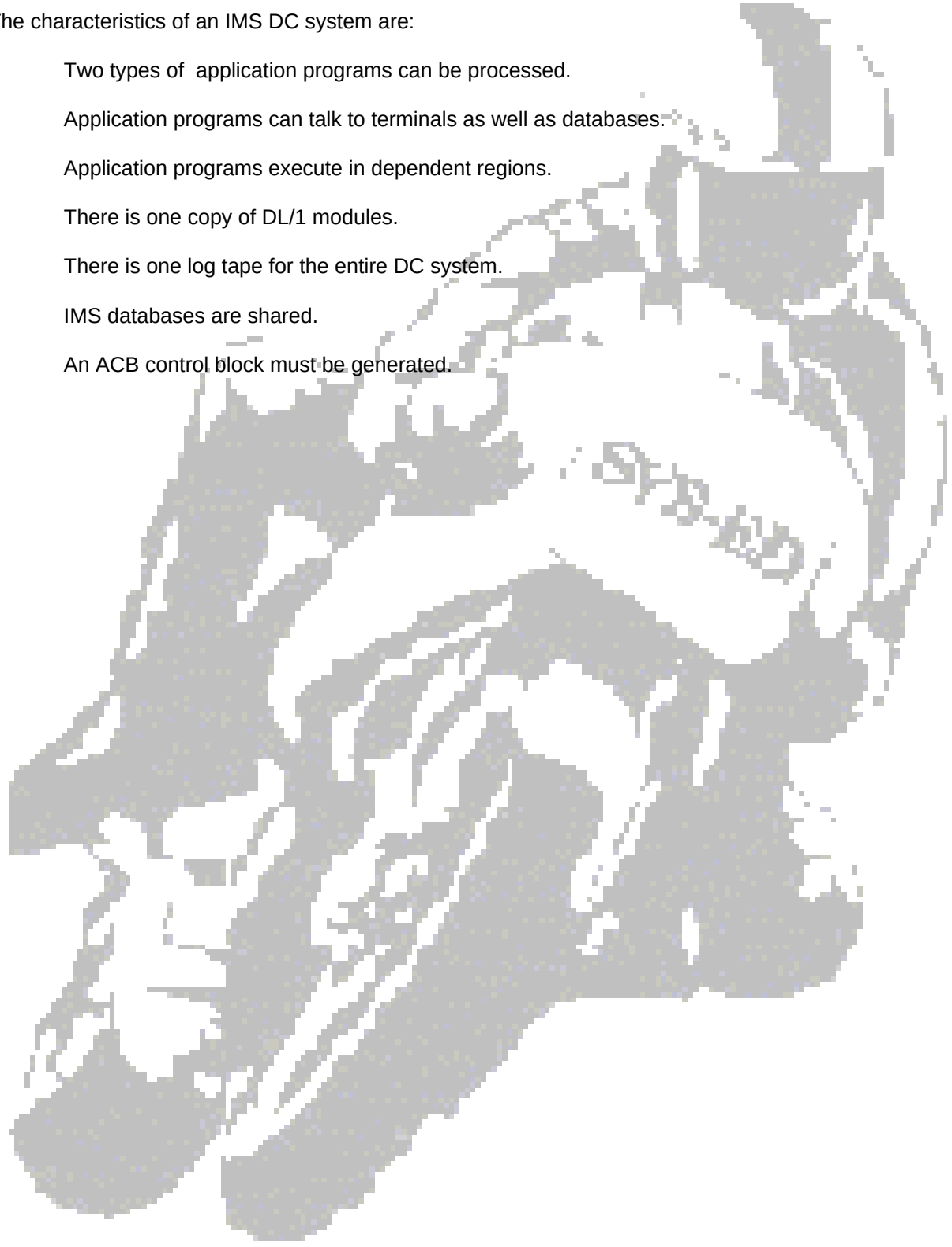
7 IMS DC System Overview



8 IMS DC System

The characteristics of an IMS DC system are:

- Two types of application programs can be processed.
- Application programs can talk to terminals as well as databases.
- Application programs execute in dependent regions.
- There is one copy of DL/1 modules.
- There is one log tape for the entire DC system.
- IMS databases are shared.
- An ACB control block must be generated.

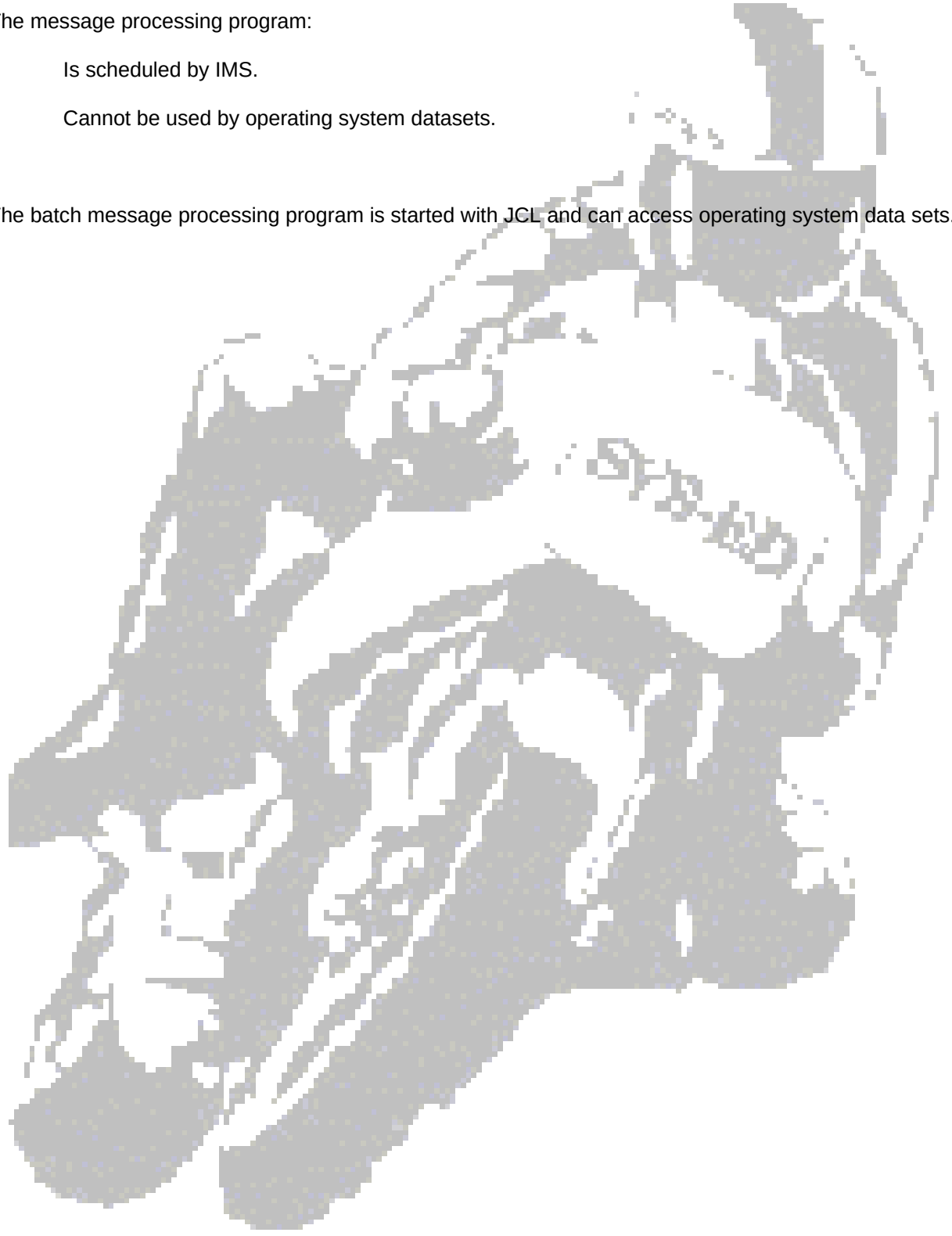


9 Two Types of DC Application Programs

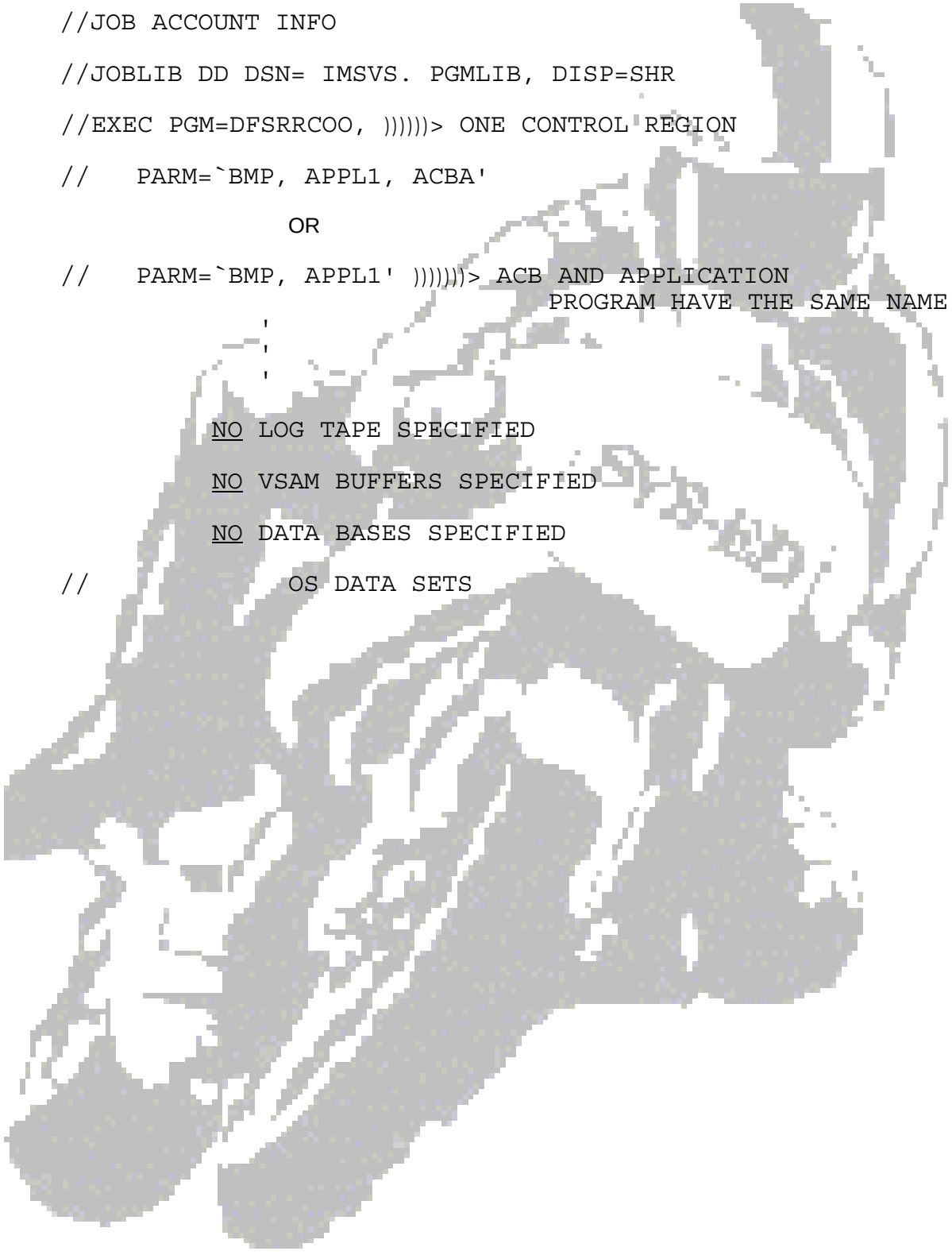
The message processing program:

- Is scheduled by IMS.
- Cannot be used by operating system datasets.

The batch message processing program is started with JCL and can access operating system data sets.



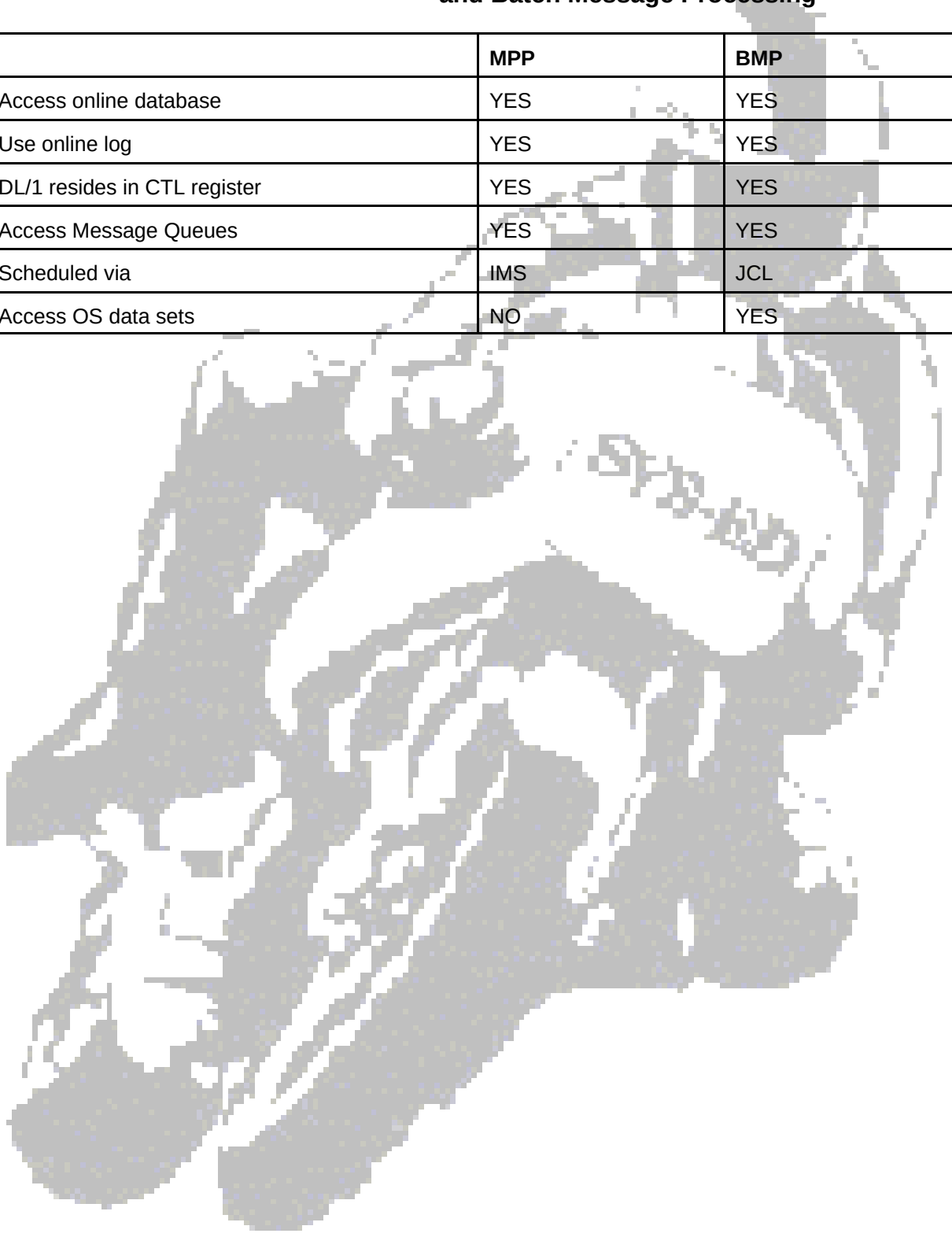
10 IMS BMP JCL



```
//JOB ACCOUNT INFO
//JOBLIB DD DSN= IMSVS. PGMLIB, DISP=SHR
//EXEC PGM=DFSRRCOO, ))))))> ONE CONTROL REGION
//   PARM=`BMP, APPL1, ACBA'
                OR
//   PARM=`BMP, APPL1' )))))))> ACB AND APPLICATION
                                PROGRAM HAVE THE SAME NAME
              '
              '
              '
          NO LOG TAPE SPECIFIED
          NO VSAM BUFFERS SPECIFIED
          NO DATA BASES SPECIFIED
//             OS DATA SETS
```

11 Comparison of Message Processing and Batch Message Processing

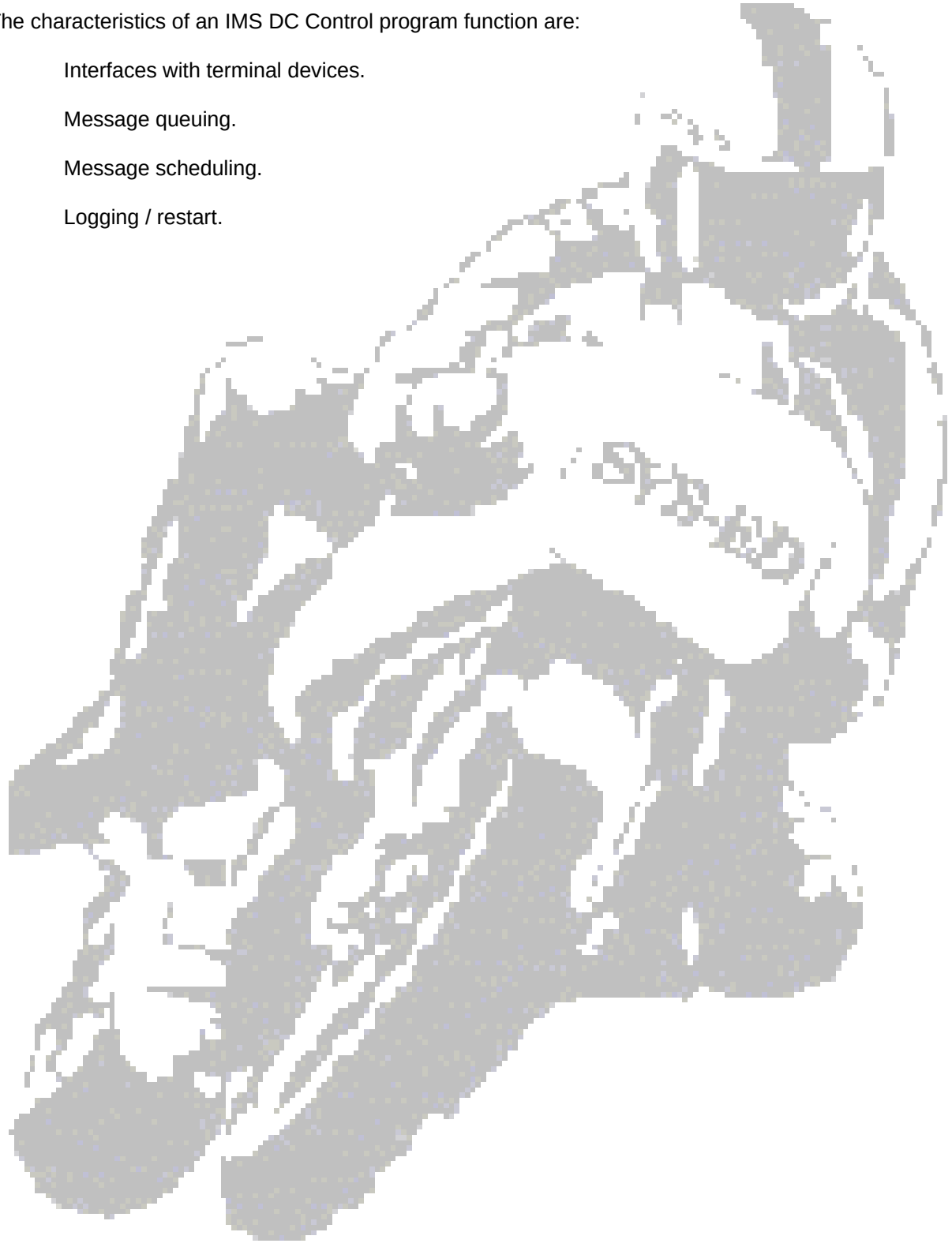
	MPP	**BMP**
Access online database	YES	YES
Use online log	YES	YES
DL/1 resides in CTL register	YES	YES
Access Message Queues	YES	YES
Scheduled via	IMS	JCL
Access OS data sets	NO	YES



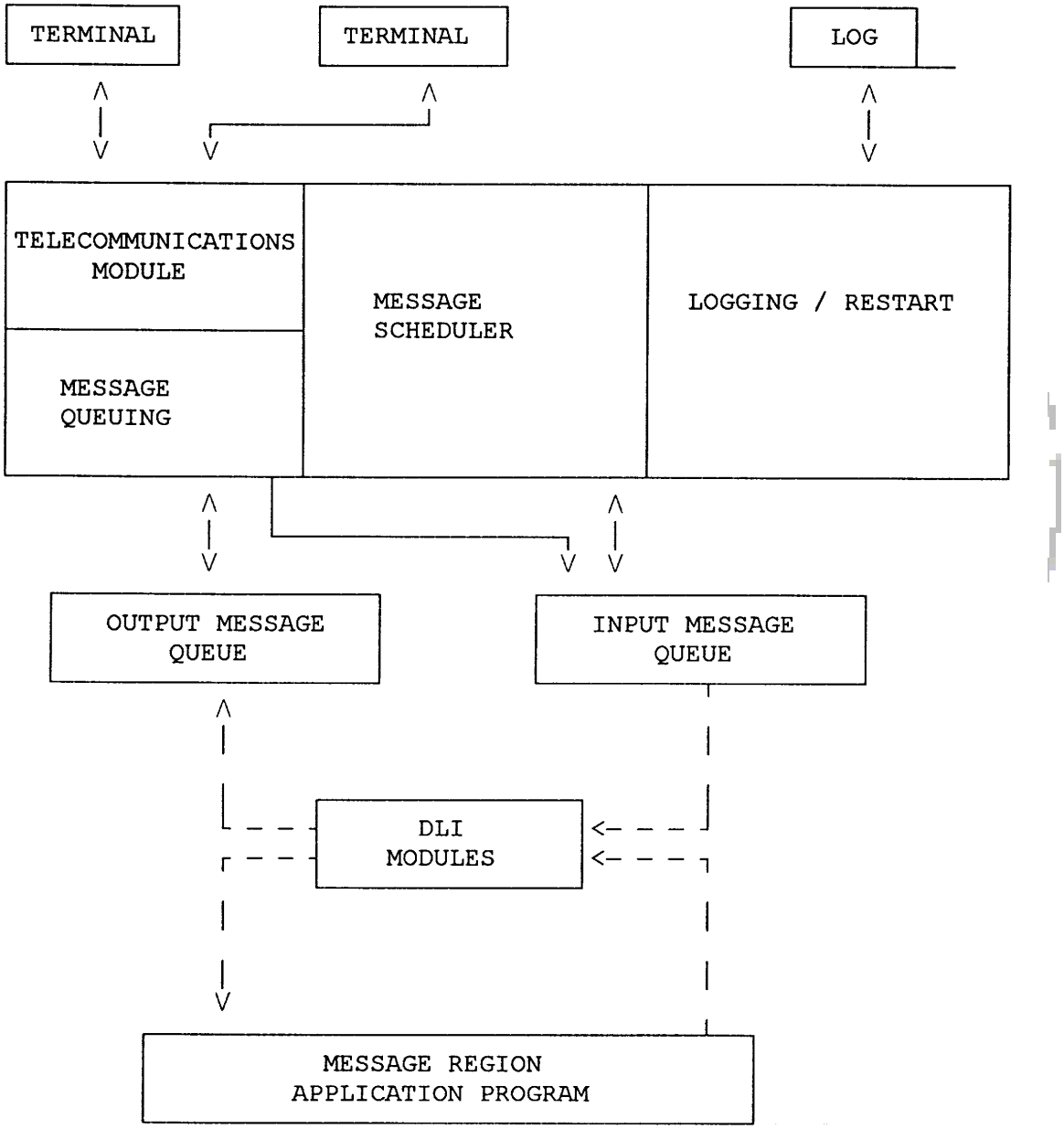
12 IMS DC Control Program

The characteristics of an IMS DC Control program function are:

- Interfaces with terminal devices.
- Message queuing.
- Message scheduling.
- Logging / restart.

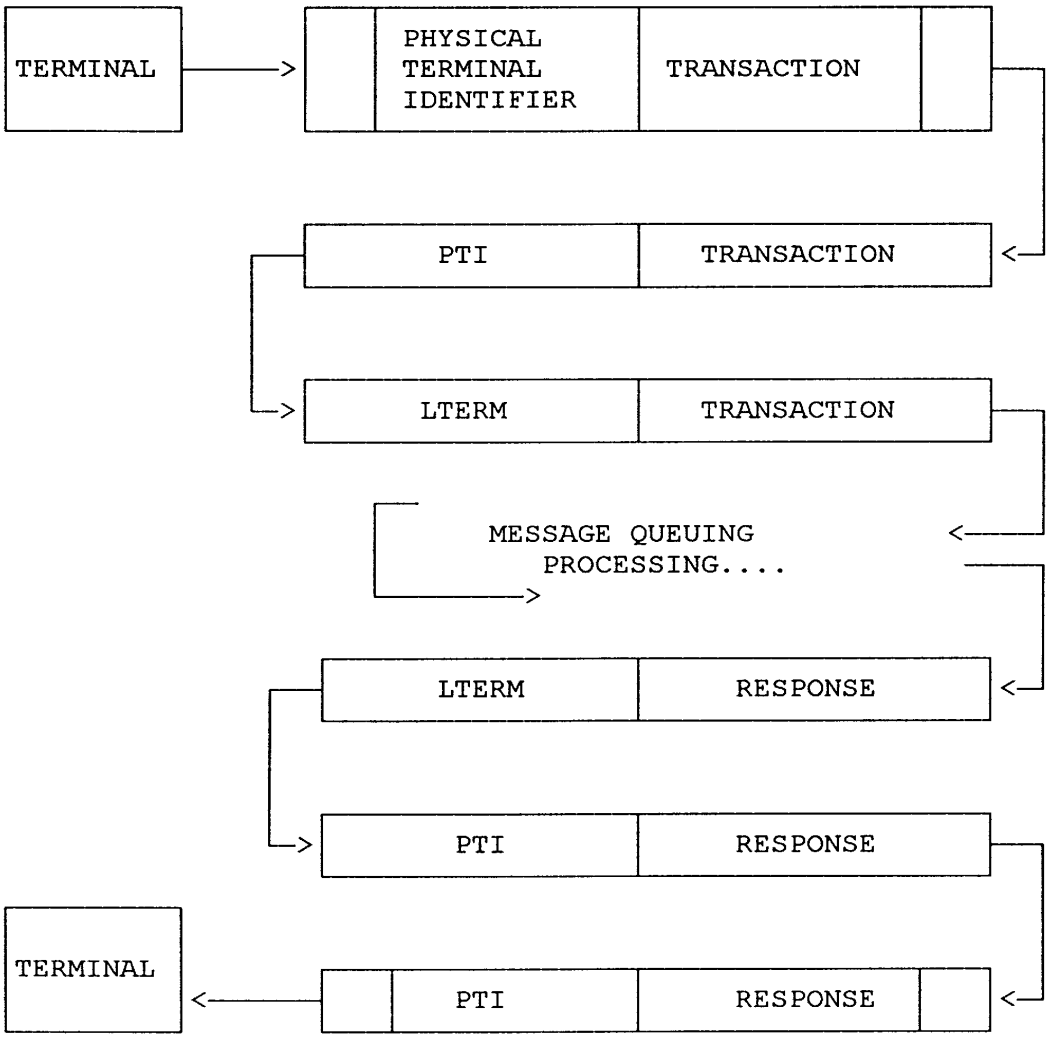


13 IMS DC Control Program Overview



14 IMS Telecommunications Module

- Removes all devices and line control characters from input transactions.
- Replaces physical terminal identifier with a logical terminal name.
- Replaces all device and line control characters on output transactions.



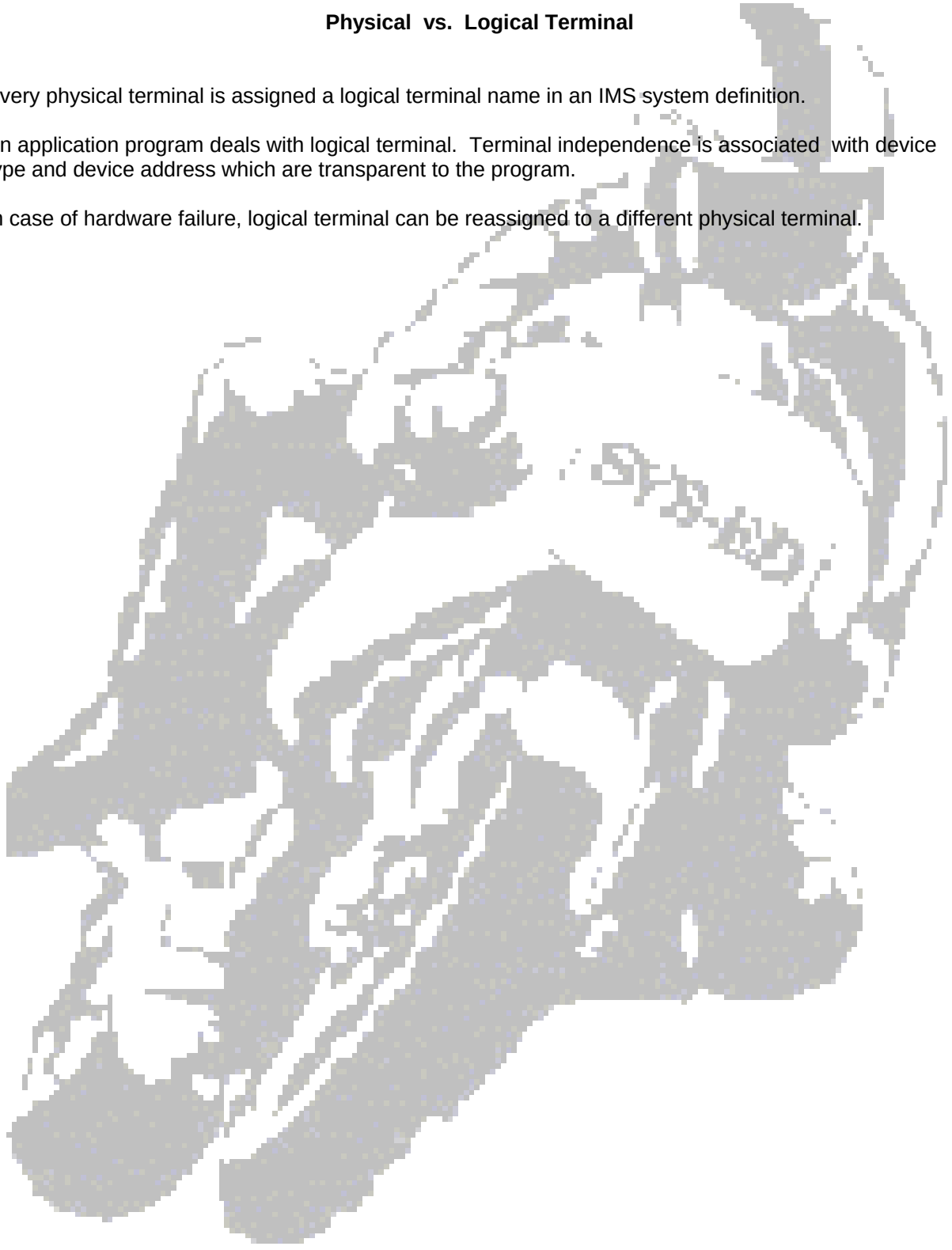
15 Terminals

Physical vs. Logical Terminal

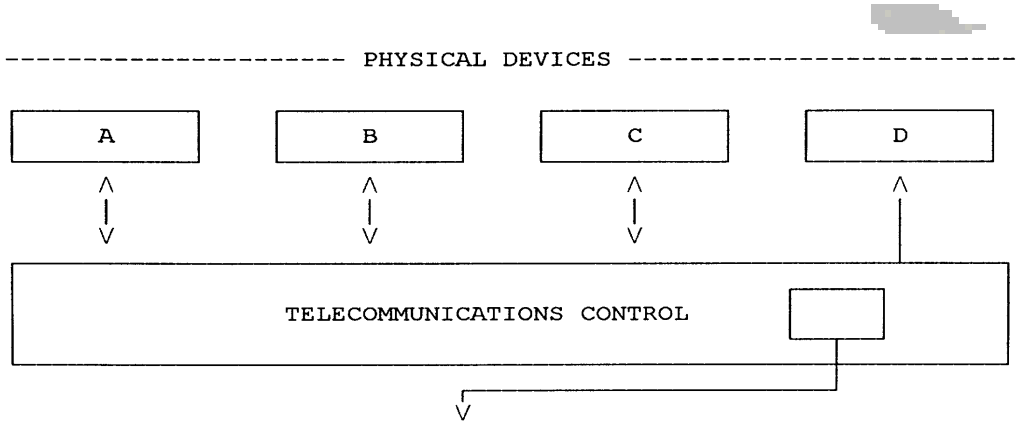
Every physical terminal is assigned a logical terminal name in an IMS system definition.

An application program deals with logical terminal. Terminal independence is associated with device type and device address which are transparent to the program.

In case of hardware failure, logical terminal can be reassigned to a different physical terminal.



16 LTERM Table



PHYSICAL	LOGICAL
A	LTERMA
B	LTERMB
C	LTERMC
D	LTERMD
	LTERME
	LTERMF

- ASSIGNED DURING SYSTEM DEFINITION
- ASSIGNMENT CAN BE CHANGED DYNAMICALLY
- TERMINAL INDEPENDENCE

17 DC Hardware

IMS supports a variety of terminal types:

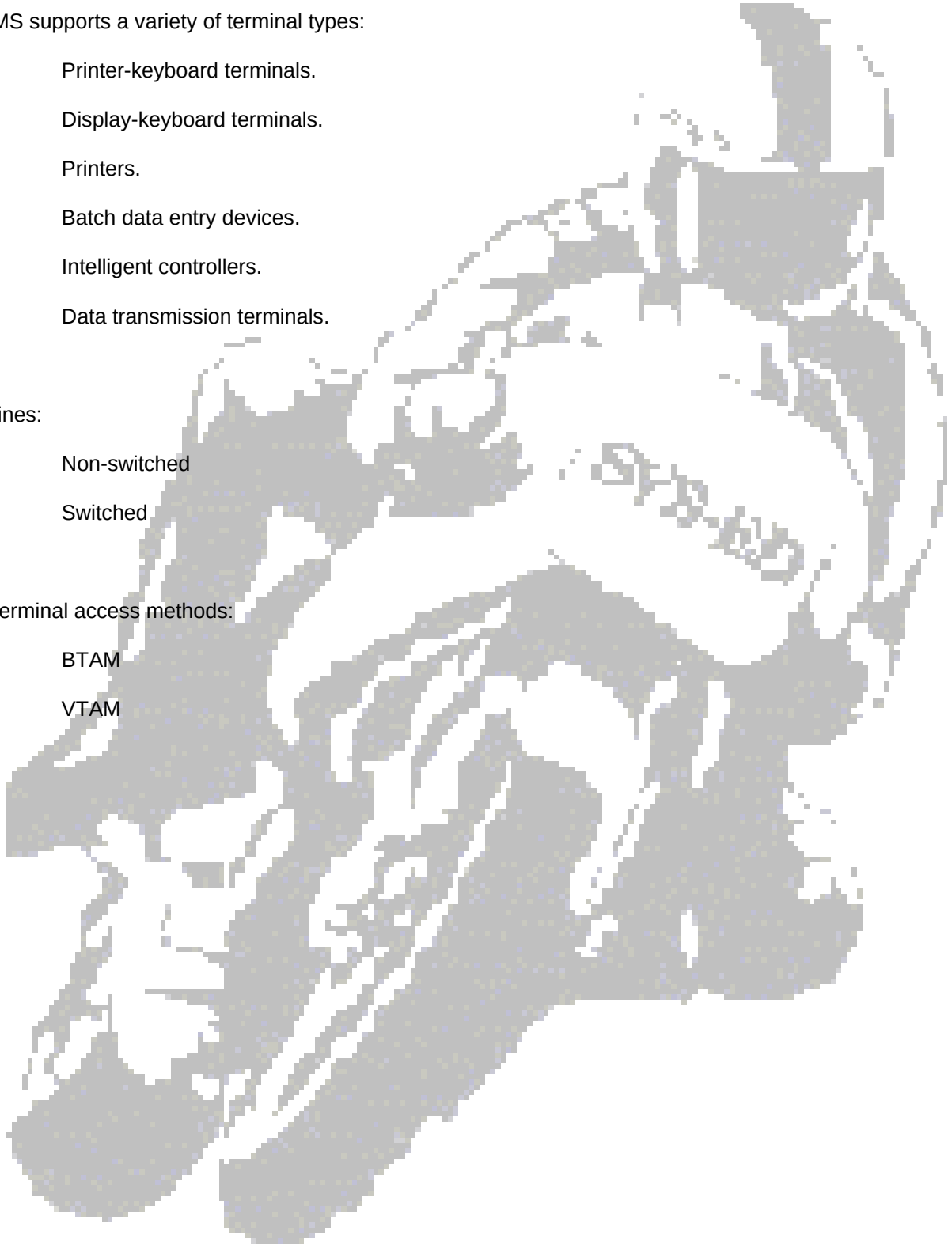
- Printer-keyboard terminals.
- Display-keyboard terminals.
- Printers.
- Batch data entry devices.
- Intelligent controllers.
- Data transmission terminals.

Lines:

- Non-switched
- Switched

Terminal access methods:

- BTAM
- VTAM



IMS TERMINAL SUPPORT

VIDEO

3270 LOCAL
3270 REMOTE
2260 LOCAL
2260 REMOTE
2265 REMOTE

TYPEWRITER

2740
2741
MAG CARD
3767

COMPONENT

1050
2770
2780
3770

PROGRAMMABLE

3790
3600

COMPUTERS

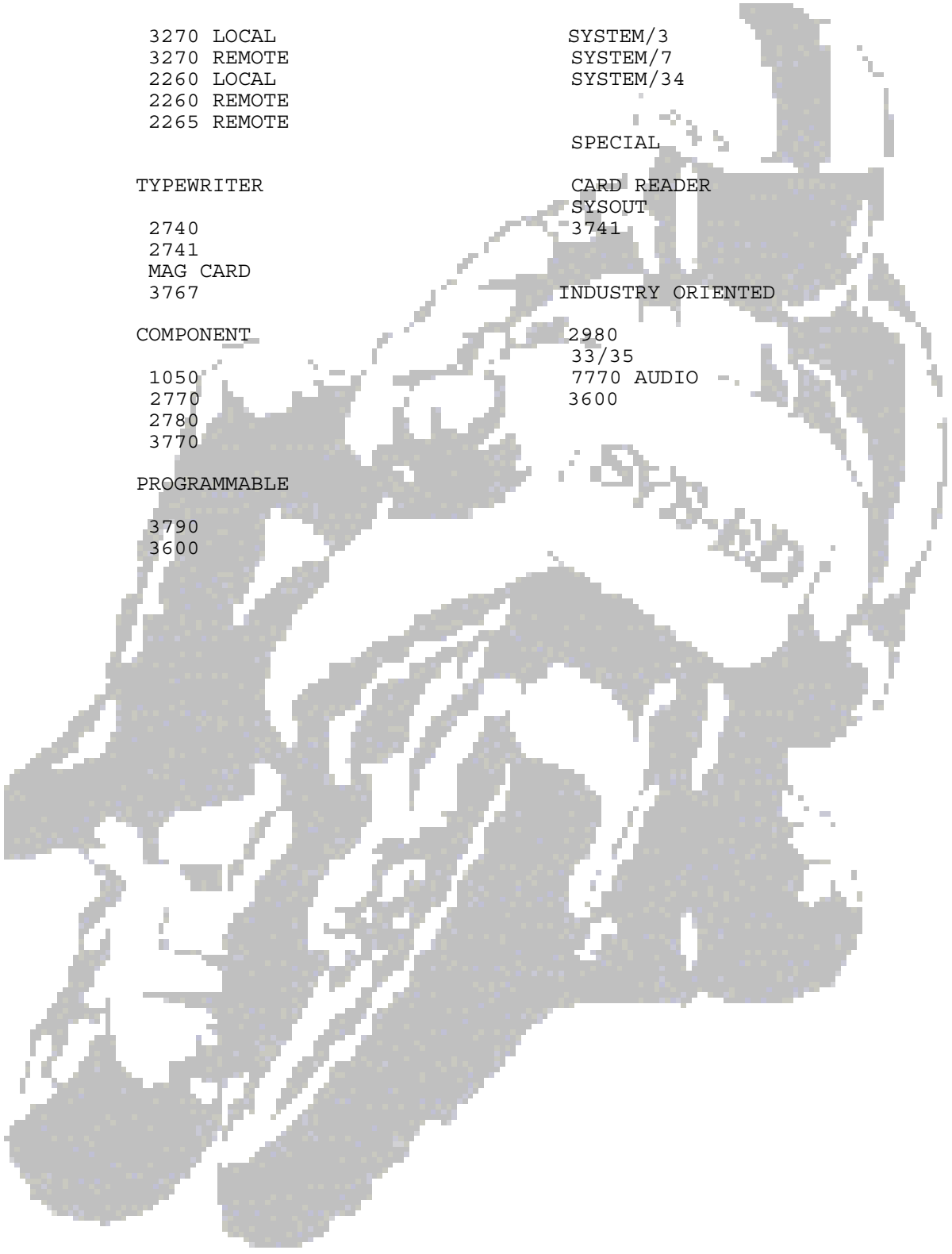
SYSTEM/3
SYSTEM/7
SYSTEM/34

SPECIAL

CARD READER
SYSOUT
3741

INDUSTRY ORIENTED

2980
33/35
7770 AUDIO
3600



18 IMS Master Terminal

The IMS Master Terminal:

- Is a logical terminal defined to IMS system as its control center.
- Can issue all IMS commands.
- Monitors and take status of the IMS system.
- Can dynamically change resources which were previously defined at system definition.

Examples:

/DISPLAY (TERMINAL) /DIS	Displays the status of IMS message queues and resources.

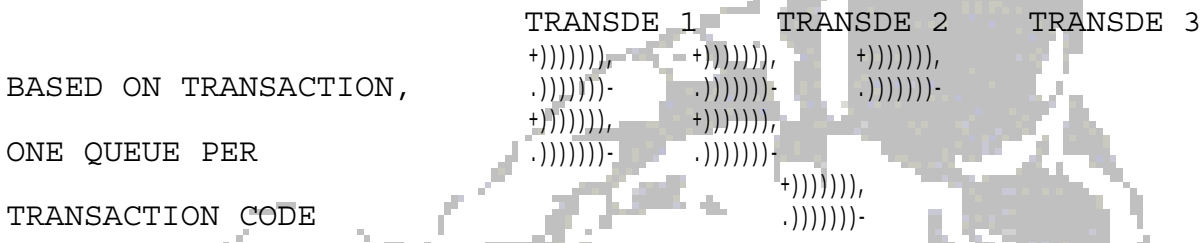
/START (DATABASE) /STA	Starts resources and makes them available to IMS.

/ASSIGN (CLASS) TO (REGION) /ASS	Changes the relationships between IMS resources that were defined during system definition.

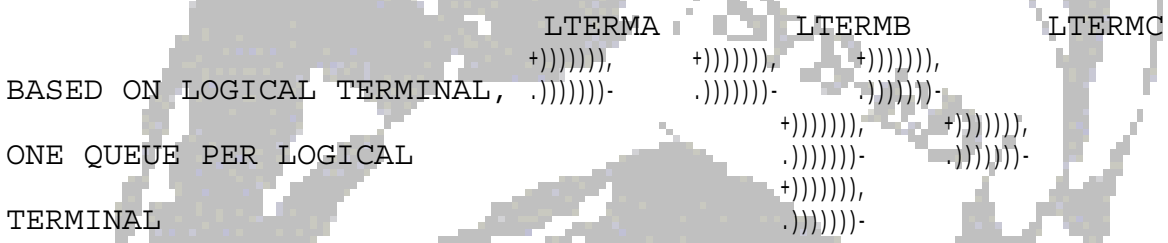
19 Message Queues

A message queue is the main storage or secondary storage area where messages are queued prior to being processed by an application program (input) or sent to a terminal (output).

Input Queues



Output Queues



Transactions for BMP programs remain in message queues until JCL is submitted and the program is started.

20 A Message

A message is a string of data routed through the IMS telecommunications environment.

There are several message types:

IMS commands

```
FORMAT
+)))))))))))))))))))))))))))))))))))))))),
*     /COMMAND b KEYWORD b PARAMETERS      *
.)))))))))))))))))))))))))))))))))))))))-
```

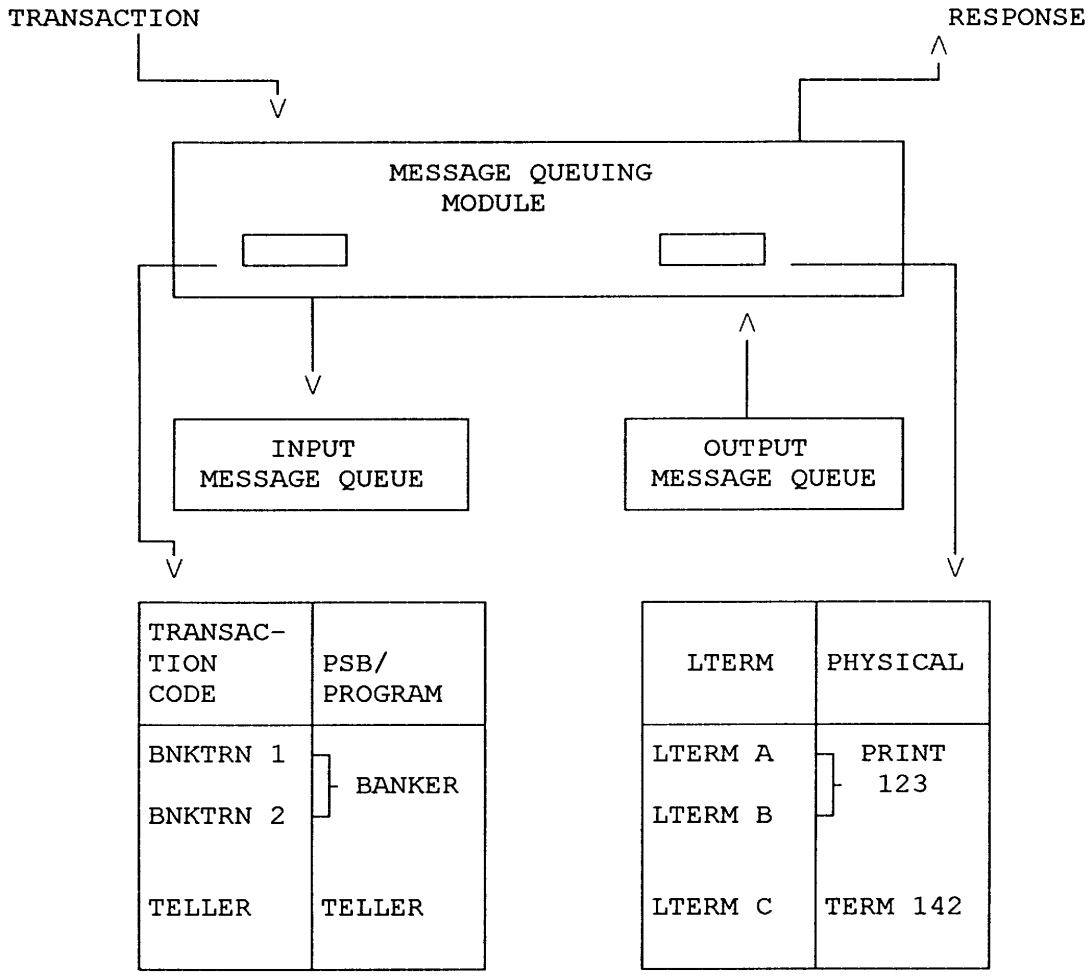
Transactions

```
FORMAT
+)))))))))))))))))))))))))))))))))))))),
*    TRANSACTION CODE b USER DATA          *
.)))))))))))))))))))))))))))))))))))))-
             1 - 8 BYTES
```

Message Switch (Terminal-to-Terminal)

```
FORMAT
+)))))))))))))))))))))))))))))))))))),
*      LTERM NAME b MESSAGE TEXT           *
.)))))))))))))))))))))))))))))))))))-
             1 - 8 BYTES
```

21 Message Queuing Flow



22 Message Scheduling

Transactions

Priority	(0-14)
Message class	(1-255)

A transaction is established at system definition:

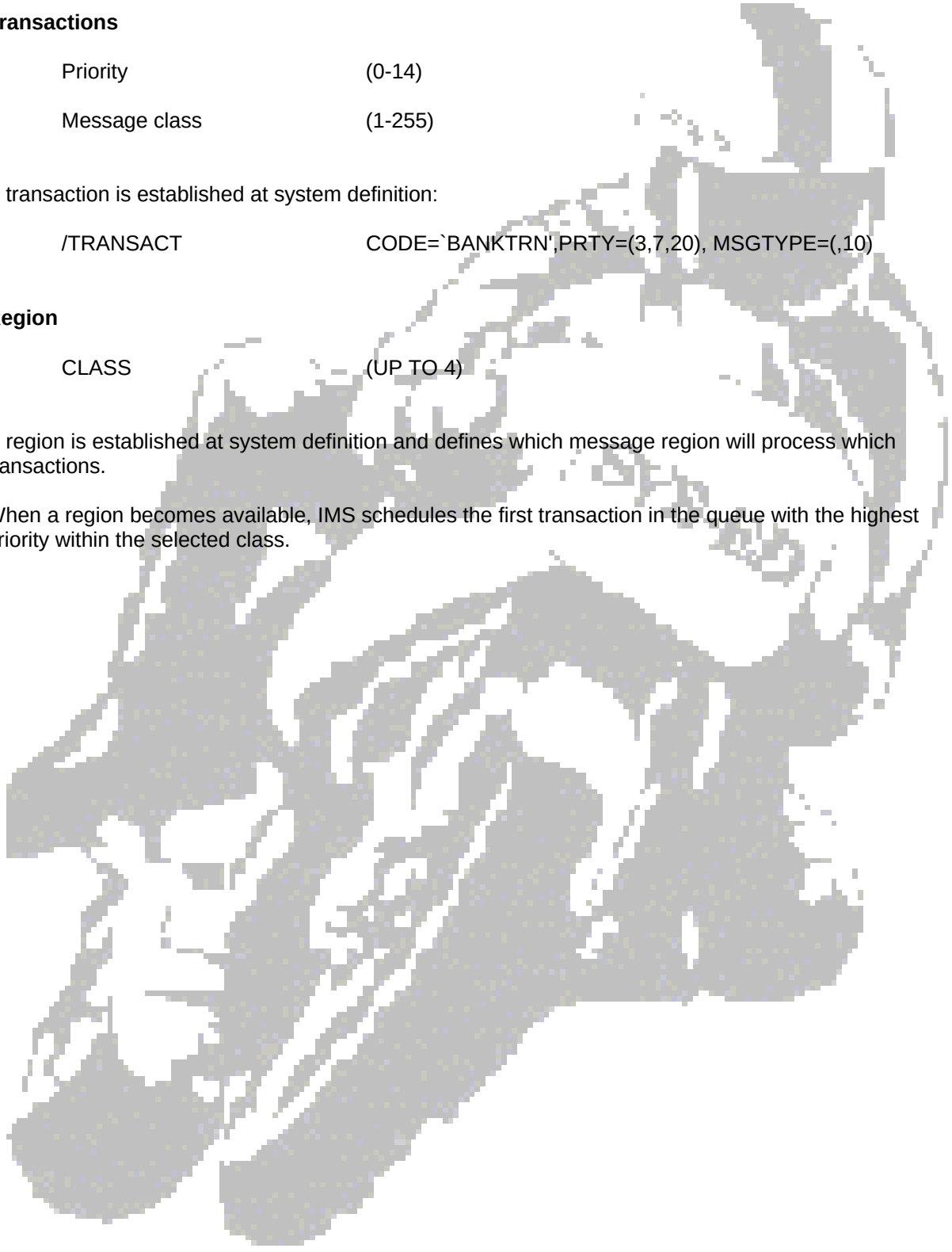
/TRANSACT	CODE=`BANKTRN',PRTY=(3,7,20), MSGTYPE=(,10)

Region

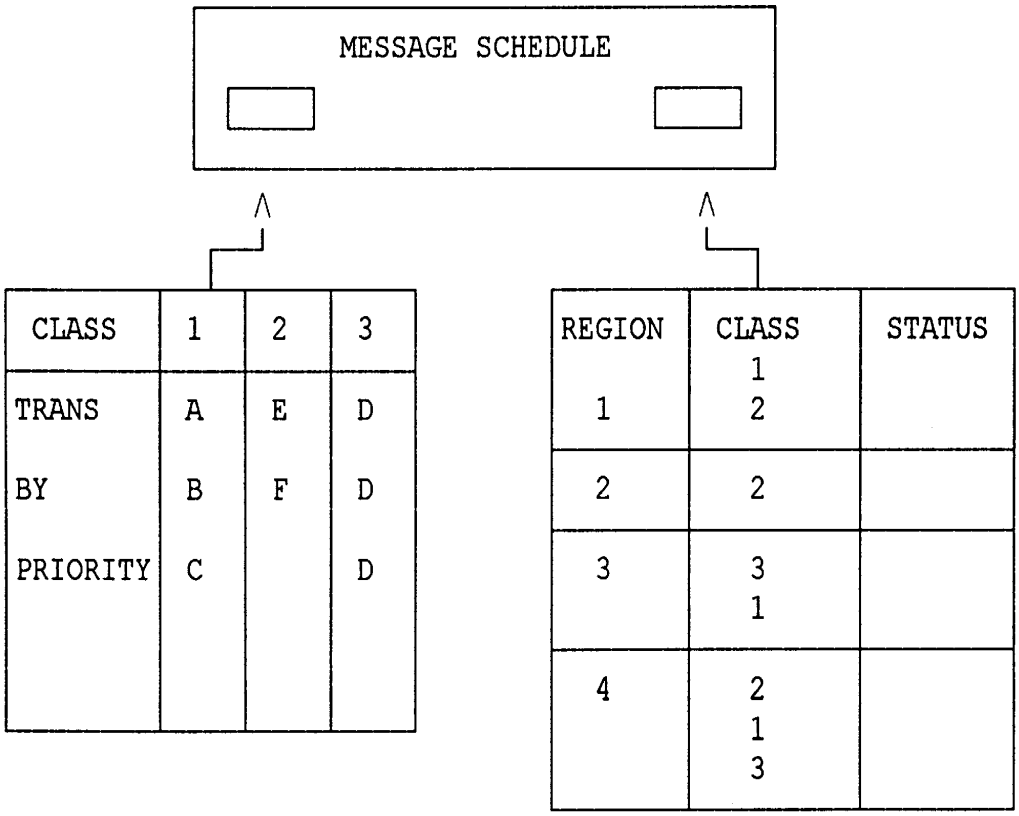
CLASS	(UP TO 4)

A region is established at system definition and defines which message region will process which transactions.

When a region becomes available, IMS schedules the first transaction in the queue with the highest priority within the selected class.



23 Message Scheduling Flow



CLASS	1	2	3
TRANS	A	E	D
BY	B	F	D
PRIORITY	C		D

REGION	CLASS	STATUS
1	1 2	
2	2	
3	3 1	
4	2 1 3	

24 Transaction Code

A transaction code:

- Tells IMS what program should be executed.
- Is related to program / PSB.
- is established at system definition.

APPLCTN MACRO

- Tells IMS the PSB name and program type.
- For MPP programs PSB is program name.
- For BMP Programs PSB may or may not be the same as the program name.

TRANSACT MACRO

- Tells IMS the transaction mode related to program / psb.

Example:

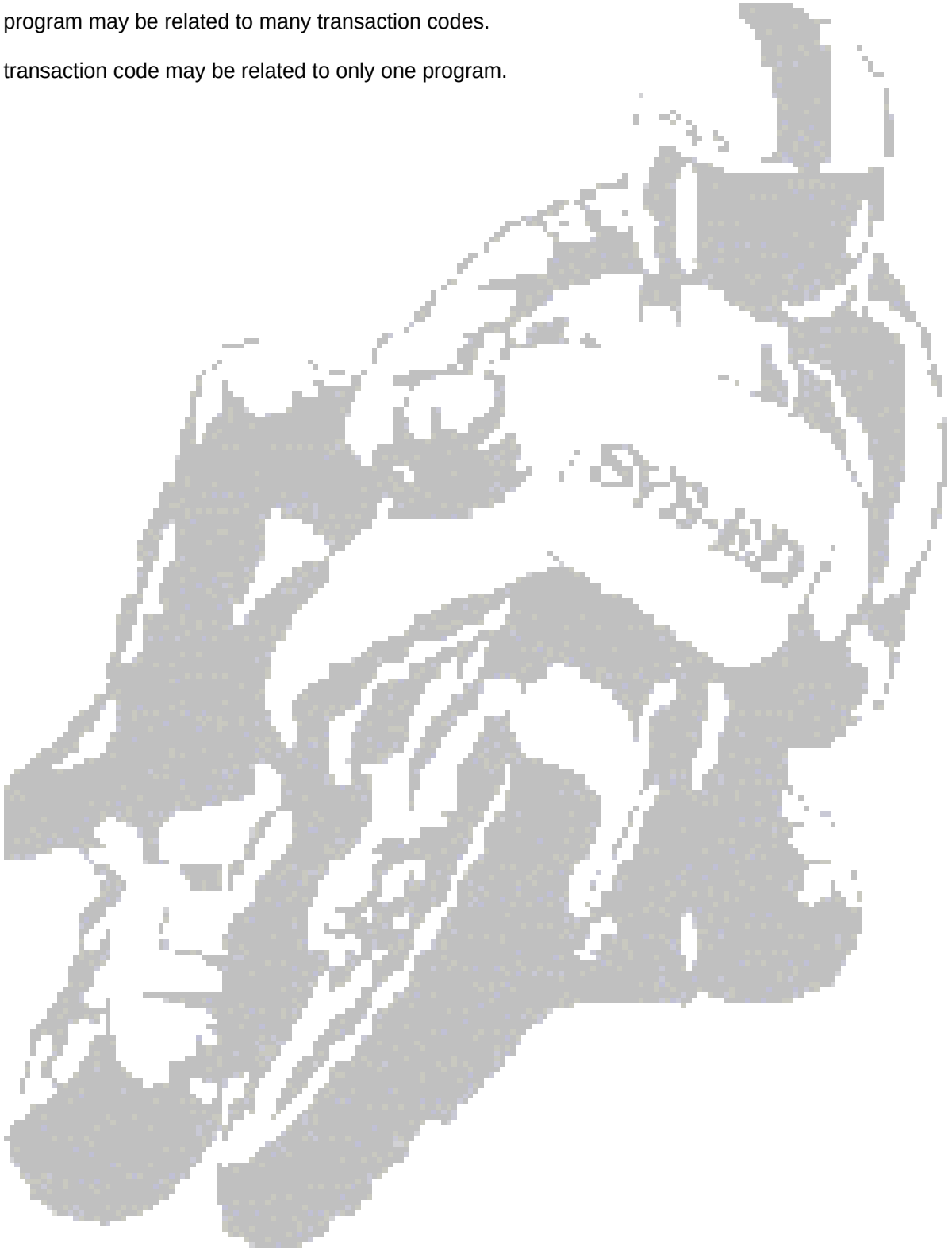
```
        /APPLCTN     PSB=BANKER, PGMTYPE=TP
        /TRANSACT    CODE=BANKTRN

                                RELATED
  BANKTRN <\\\\\\\\\>           BANKER
```

25 Transaction Code Rule

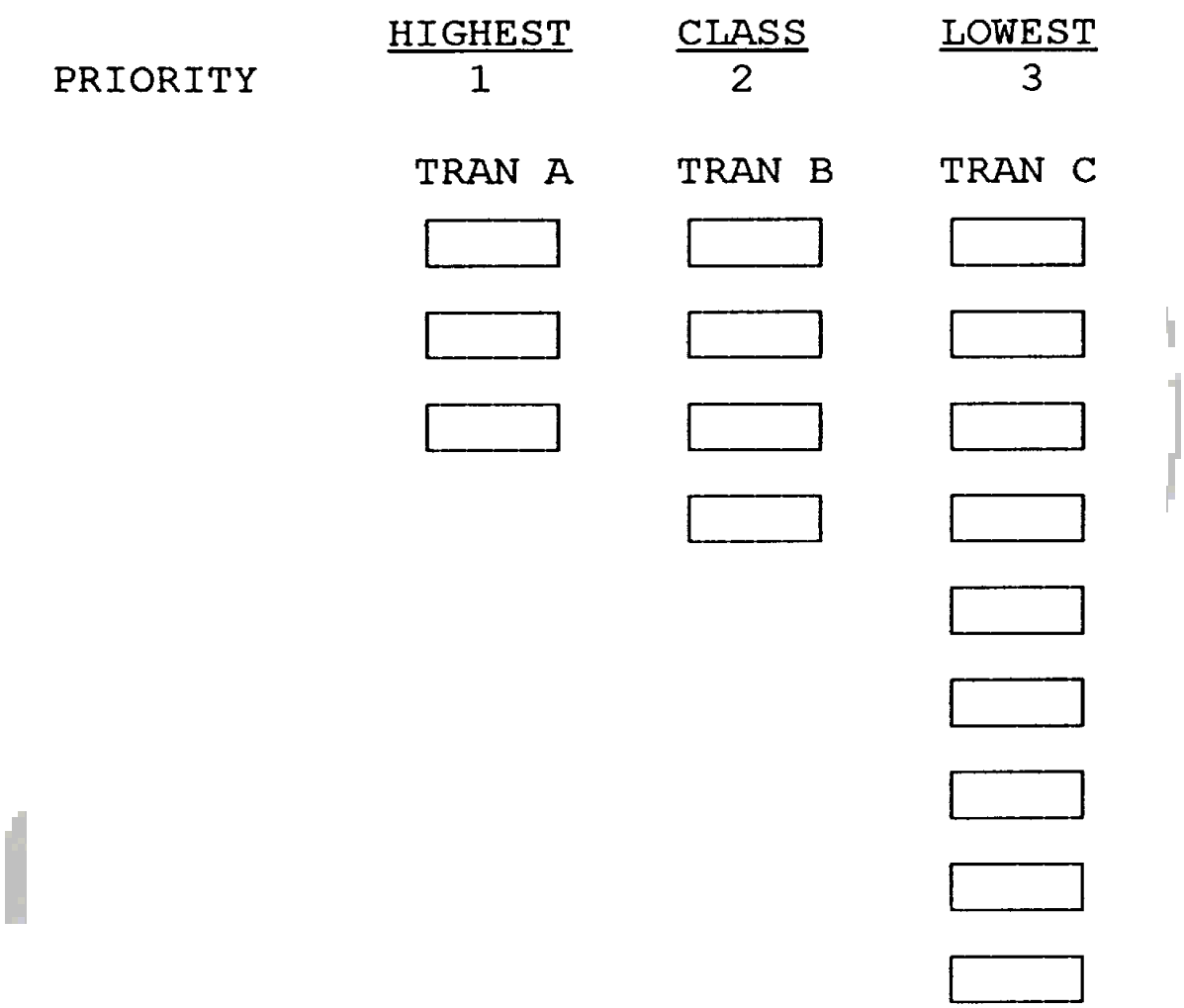
A program may be related to many transaction codes.

A transaction code may be related to only one program.



26 Transaction Selection Priorities

Transaction selection priorities is the Message scheduler's means of preventing message queue buildup.



Transaction:

normal priority

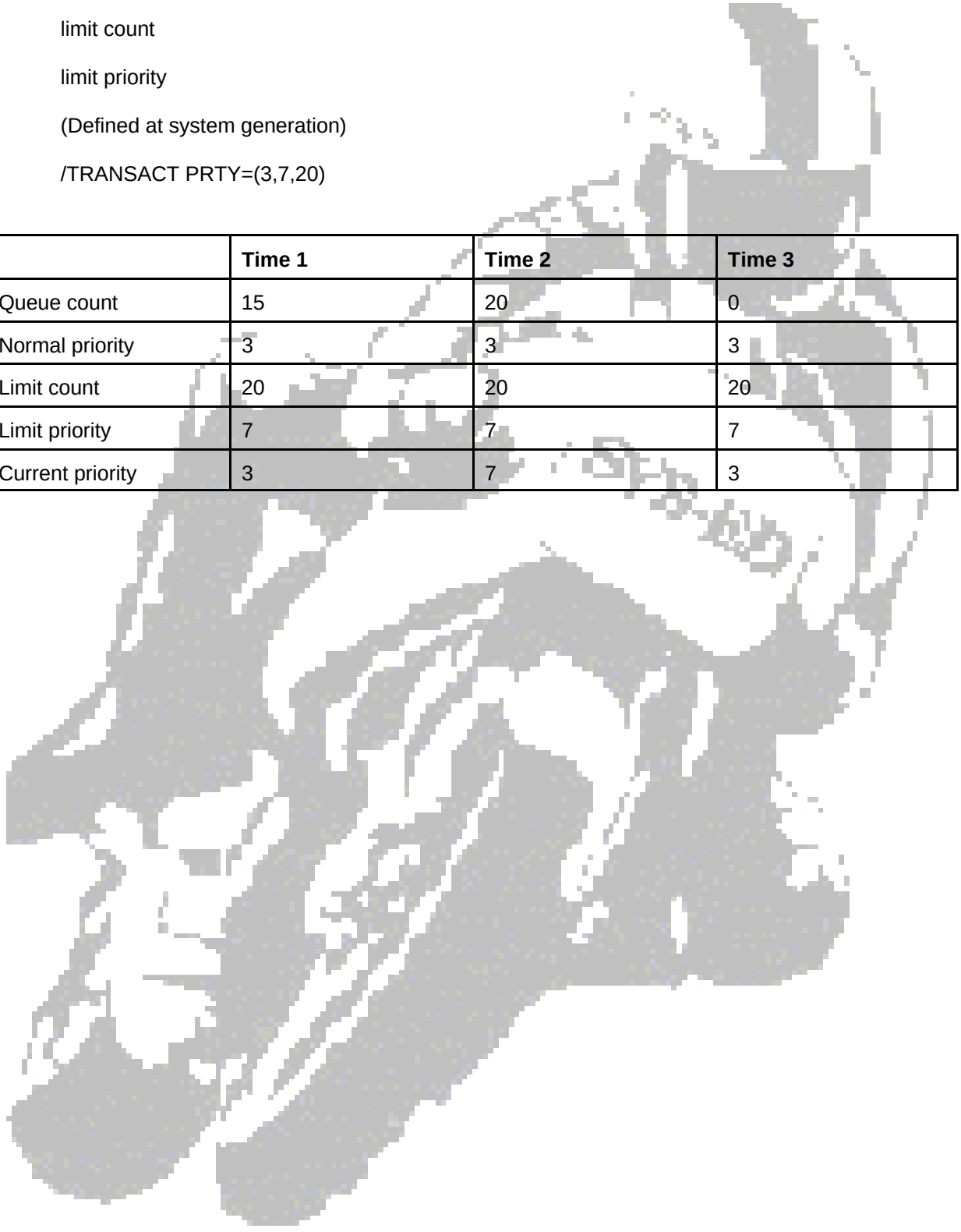
limit count

limit priority

(Defined at system generation)

/TRANSACT PRTY=(3,7,20)

	Time 1	**Time 2**	**Time 3**
Queue count	15	20	0
Normal priority	3	3	3
Limit count	20	20	20
Limit priority	7	7	7
Current priority	3	7	3



27 Parallel Processing

Parallel processing is when an application program is allowed to execute in multiple regions simultaneously. It is defined at system definition.

Examples:

Transactions are on the input message queue in this order:

PROGRAM A
PROGRAM A
PROGRAM B

//APPLCTN=, SCHDTYPE=PARALLEL

WAIT
(PROGRAM B)

MESSAGE REGION
PROGRAM A
PROGRAM A

/APPLCTN=, SCHDTYP=SERIAL

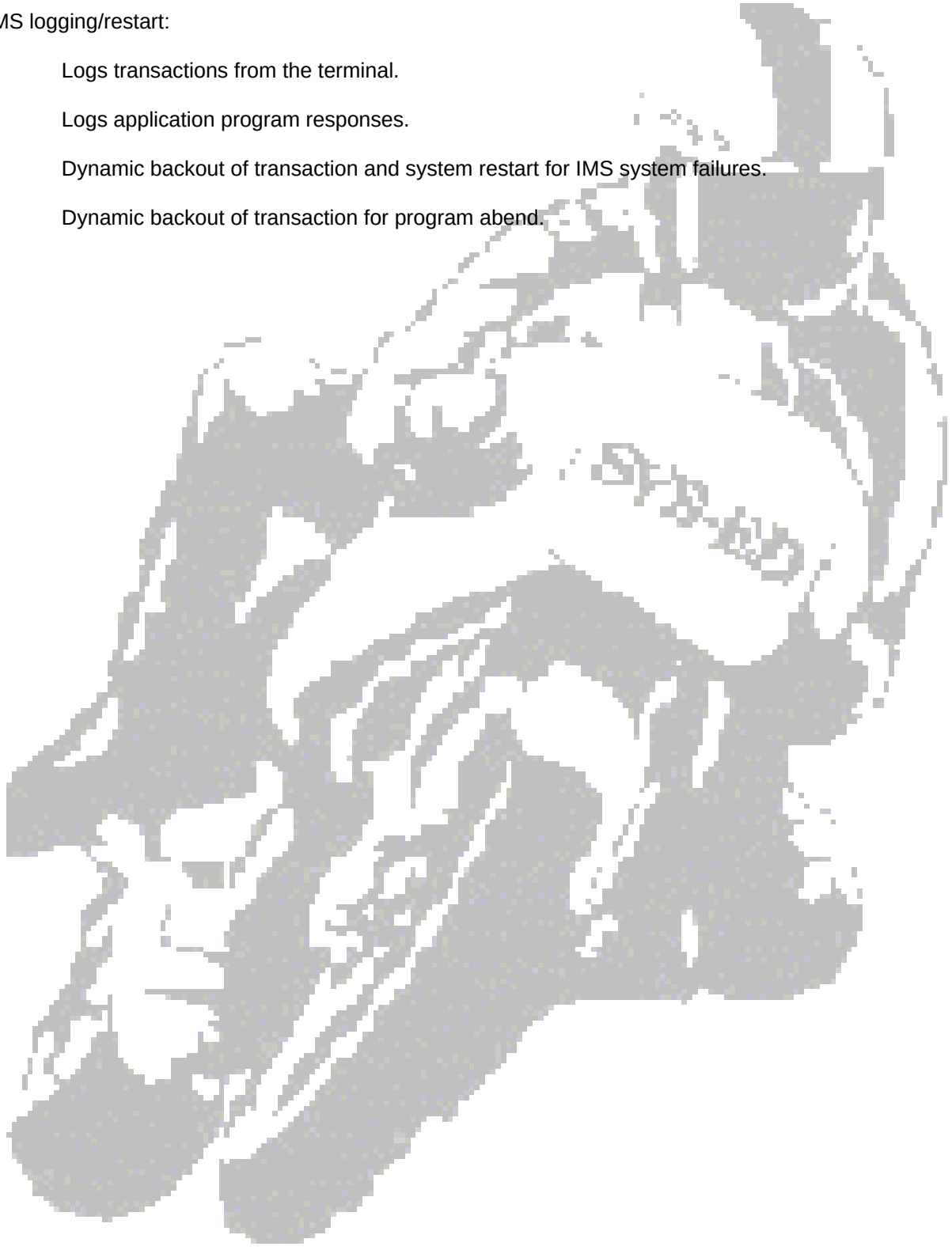
WAIT
(PROGRAM A)

MESSAGE REGION
PROGRAM A
PROGRAM B

28 IMS Logging/Restart

IMS logging/restart:

- Logs transactions from the terminal.
- Logs application program responses.
- Dynamic backout of transaction and system restart for IMS system failures.
- Dynamic backout of transaction for program abend.



29 Program Isolation

Program isolation is needed because in a DC environment databases are shared:

C Three types of database accesses are defined in PSBGEN:

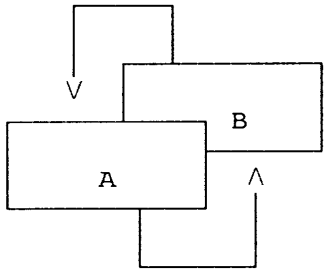
READ ONLY	(1)	PROCOPT = G
SINGLE UPDATE	(2)	PROCOPT = GIRD OR A
EXCLUSIVE UPDATE	(3)	PROCOPT = E

Each type is assigned a number by IMS. When a call is issued against a segment, currently being used, ims will add up the number for each access.

If the sum is $\geq$ 4 the issued access is suspended.

o DEADLOCK CAN OCCUR

ROOTS



A WANTS TO READ B

AND

B WANTS TO READ A

IMS abends one program, then automatically restarts it.

30 Conversational Processing

A transaction defined in system generation can be conversational or non-conversational.

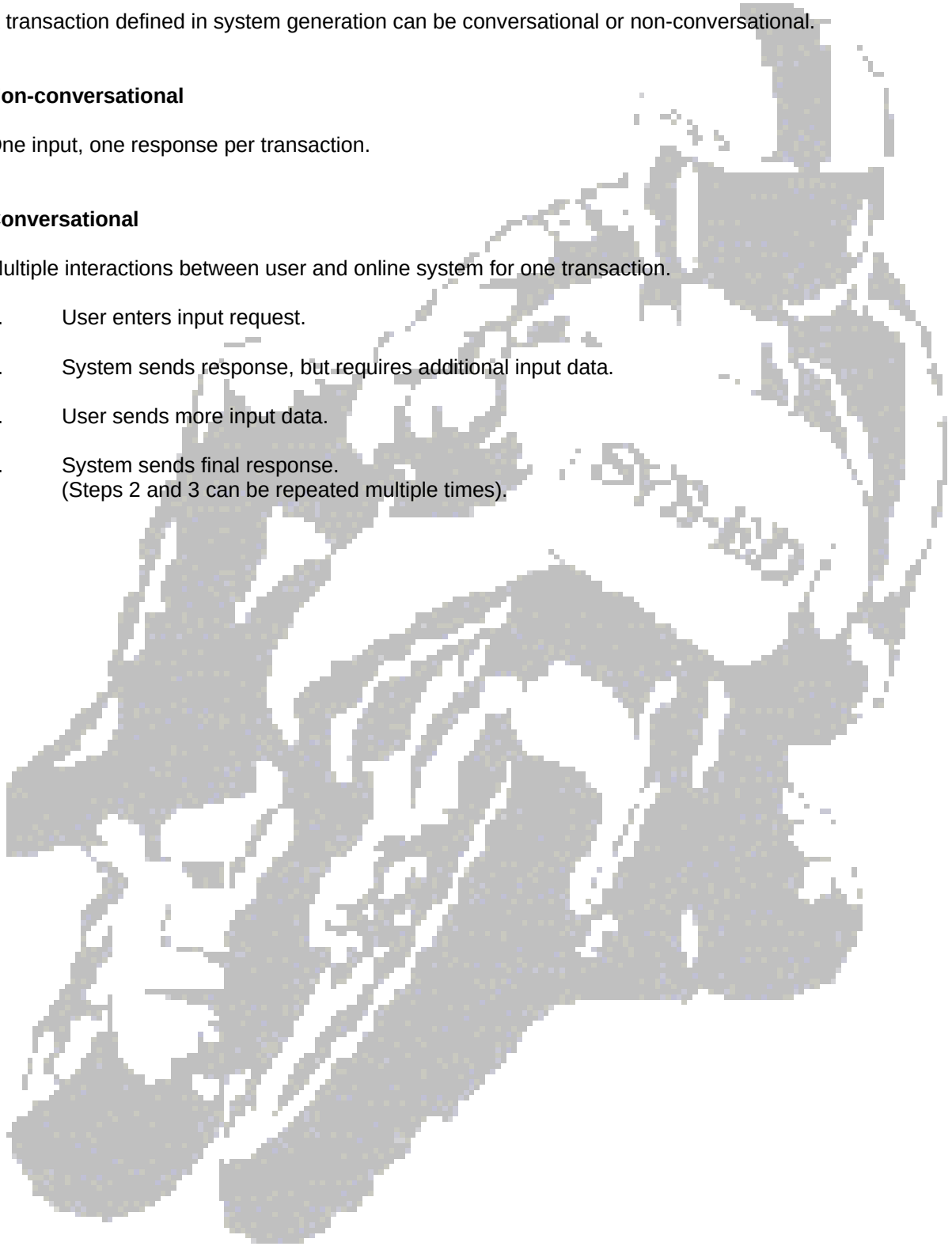
Non-conversational

One input, one response per transaction.

Conversational

Multiple interactions between user and online system for one transaction.

1. User enters input request.
2. System sends response, but requires additional input data.
3. User sends more input data.
4. System sends final response.
   (Steps 2 and 3 can be repeated multiple times).



An application program does not remain in the region for an entire conversation.

A program is loaded into the message region for each receipt of input data.

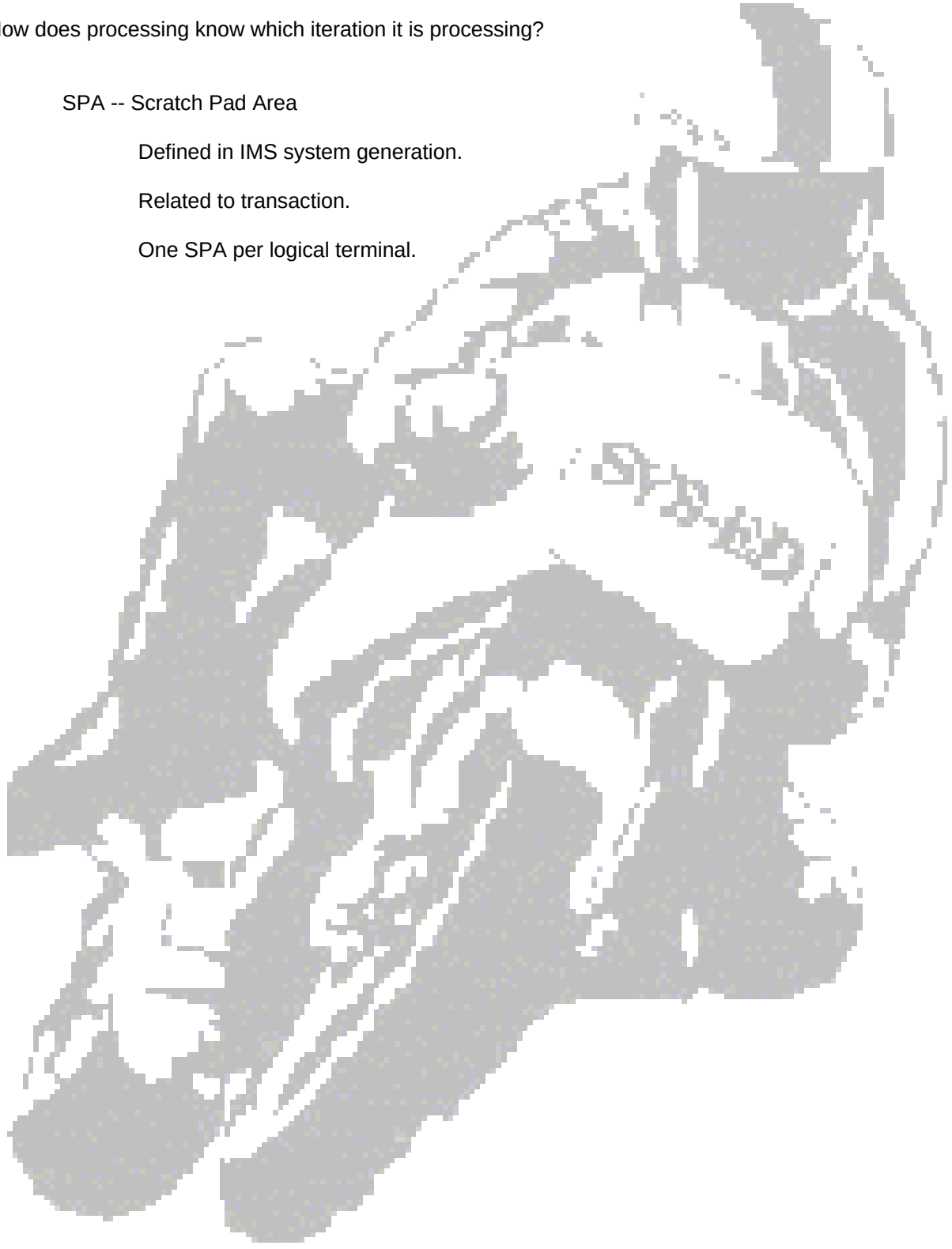
How does processing know which iteration it is processing?

SPA -- Scratch Pad Area

Defined in IMS system generation.

Related to transaction.

One SPA per logical terminal.



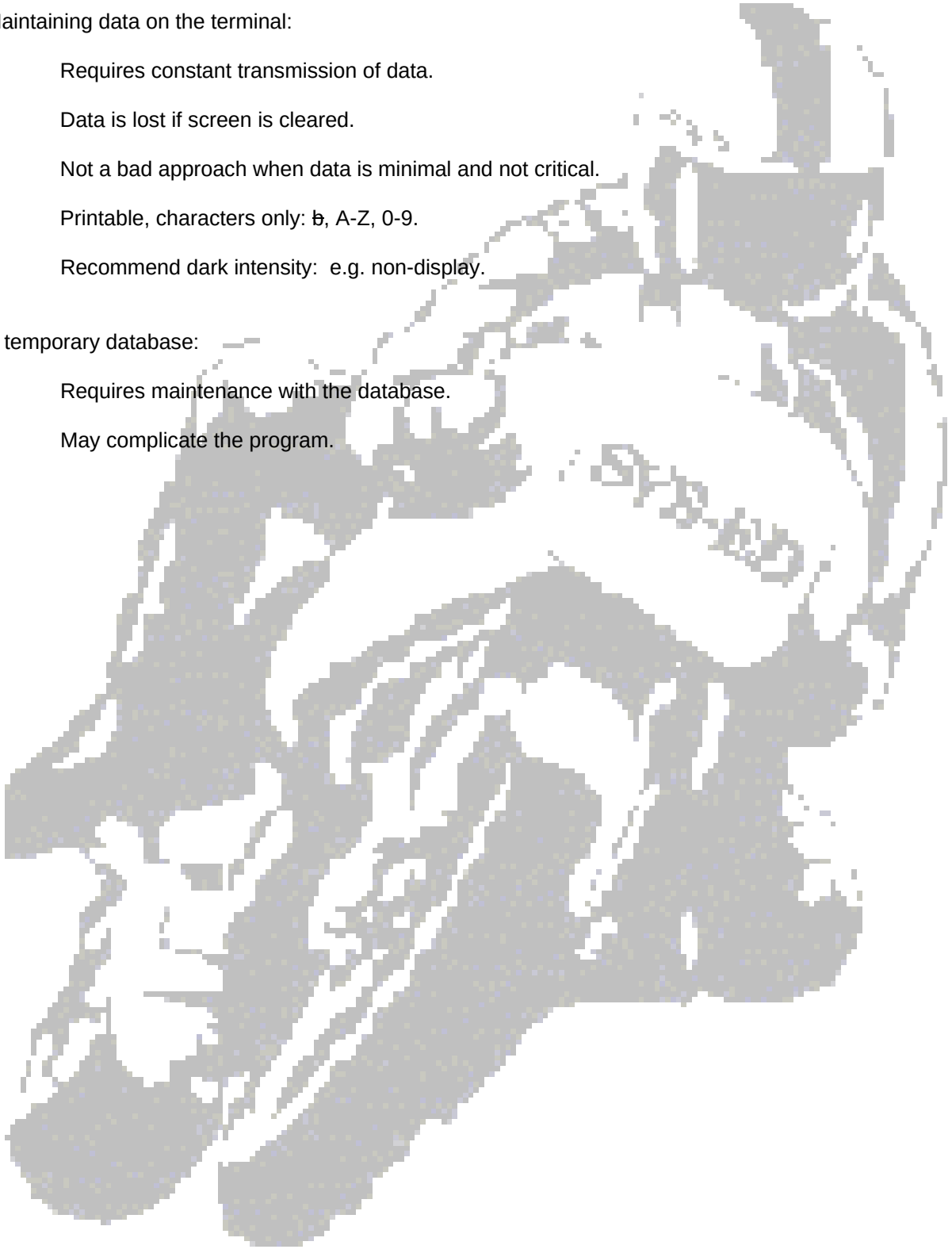
31 Alternatives to SPA

Maintaining data on the terminal:

- Requires constant transmission of data.
- Data is lost if screen is cleared.
- Not a bad approach when data is minimal and not critical.
- Printable, characters only: ~~b~~, A-Z, 0-9.
- Recommend dark intensity: e.g. non-display.

A temporary database:

- Requires maintenance with the database.
- May complicate the program.



32 Conversational Processing

There are two ways for terminating a conversation:

By program:

Blanks in the SPA

By user:

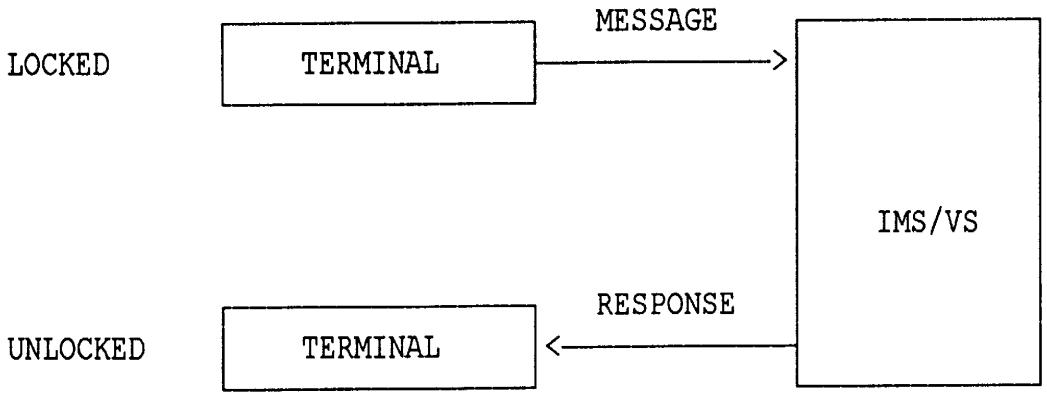
/EXIT command

/HOLD command

33 Response versus No Response Modes

Response Mode

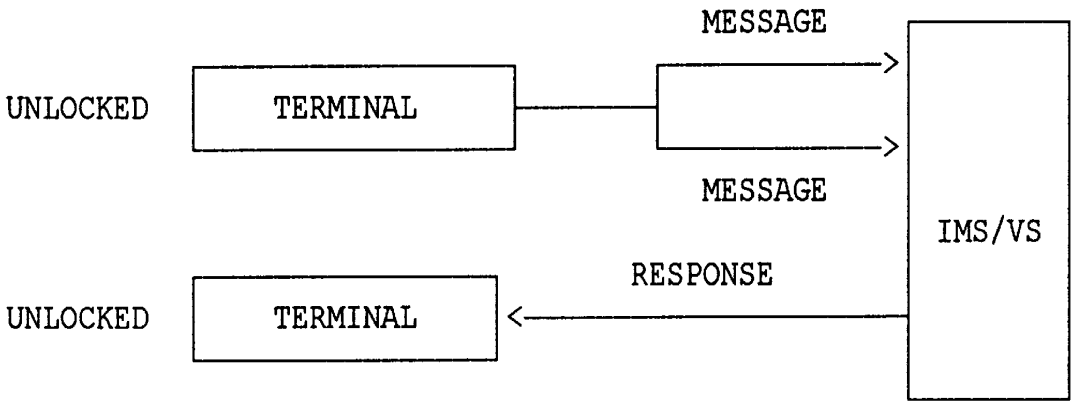
Specifies that no further messages are to be entered until the previously entered transaction sends a response message back to the terminal.



- Terminal will remain locked if application program abends.
- /STA parameters, issued from MTO will unlock the terminal.

Non Response Mode

Specifies that no cessation of input should occur after a transaction is entered.



C A user could flood the system

C user may lose track of what was sent.

Modes are defined at system definition.

/TRANSACT MSGTYPE= (, NO RESPONSE)
RESPONSE

34 Security

Defined via security maintenance program.

Terminal Security

Only designated transactions may be entered at a logical terminal.

Password Security

Pre-defined password (1-8bytes) must accompany transaction code.

```
TRAN1 (BJL) DATA ....
```

User Verification

Associates the user with the physical terminal. Only valid users may access the IMS online system.

```
/SIGN ON BJL123
```