DIGITAL

dcc

COMPACT CASSETTE

Specification Kit

PolyGram

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Subscribers of the DCC Specification Kit
UGT-700

Re: update Specification Kit

Please find enclosed an updated version of the following documents in the DCC Specification Kit:

- UGT-700 "SPECIFICATION KIT Digital Compact Cassette -Contents-" dated: **1992-05-29** replacing the previous edition of 1992-01-17.
- UGT-702 "TAPE MASTER SPECIFICATION for Digital Compact Cassette" dated: **1992-05-29** replacing the previous edition of 1991-02-18.
- UGT-705 "PRINTED MATTER for PolyGram Standards products Digital Compact Cassette -DCC-" dated: **1992-05-29** replacing the previous edition of 1992-01-17.
- UGT-706 "DCC Text mode -minimum requirements-" dated: **1992-05-29** replacing the previous edition of 1992-01-17.

Also included is a **new** chapter in this Specification Kit;

UGT-717 "DCC MASTERING PROCESS -explanatory notes-" dated: **1992-05-29.**

This document gives an explanation of the DCC Mastering Process and the relation between Tape Master and the Mastering Process.

IMPORTANT:

With immediate effect all production parts for DCC:

- Tape Masters;
- Textmode floppies;
- Films for printed matter (colour separations);
- Film for rear label - to be separate from colour separations -.

must be sent to:

PolyGram Record Service
Siebe Minkes
DCC ORDER DESK
P.O. Box 21200
3802 RE Amersfoort
The Netherlands
☎ +31 33 502 912
Fax: +31 33 560 931

(continued next page)

STANDARD FILMS

The required accuracy of DCC Printed Matter makes it necessary to standardize the whole process -from Artwork via Colour separations to finished Printed Matter-.

A special grid film has been developed in which the 3 major components have fixed positions.

Films for DCC **must** be prepared on the basis of this standard film.

Please contact us for a subscription available under ref. no. 4922 000 26160.

The same applies to a standard film for the rear label which is available under ref. no. 4922 000 26170 at the following address:

PolyGram International Music B.V.
International Standardisation
P.O. Box 23 ☎ +31 2154 19477
3740 AA Baarn Telex: 43400 phrc nl
The Netherlands Fax: +31 2154 16400

These are separate subscriptions to the Specification Kit and we strongly recommend to pass this information on to those in your organisation responsible for film preparation.

With kind regards,

Wout Natter
Manager of International Standardisation

TAPE SPECIFICATIONS

PRODUCT STANDARDS

If you have any questions about the contents of this kit please contact:
PolyGram International Music B.V.
International Standardisation
Wout Natter
P.O. Box 23 ☎ +31 2154 19477
3740 AA Baarn Telex: 43400 phrc nl
The Netherlands Fax: +31 2154 16400

For a list of Keywords see next page

1 SCOPE

This specification lays down characteristics of the DCC tape master.
It also lays down the Mastering Order Form as Appendix 1 recommended for the preparation of these tape masters.
A check list specifying a complete DCC Tape Master Set is included as Appendix 2.

2 TAPE MASTER SPECIFICATION

2.1 Tape Characteristics

- Cassette type: Professional U-matic,
- Recording format: Acc.to SONY PCM 1610/1630
- Sampling frequency: 44.1 KHz (44.056 Khz acceptable)
- Emphasis: optional 15 + 50 µs
- Number of channels: 2

2.2 Programme Modulation

For the time being the pre-recorded DCC has a playing time of maximum 90 minutes, split-up in two sectors, A and B, of maximum 45 minutes each.
Therefore the musical programme must also be split up in 2 Sectors. It is not necessary that Sectors A and B have the same length.
The following data are valid for the digital audio sector:

- Tape lead-in: 90 sec. incl. Timecode.
- Tape lead-out: min. 30 sec. incl. Timecode.
- Programme length:
  74 min. or less: Sector A and B on one tape or one tape for each sector.
  between 74 and 90 min.: one tape for each sector.

2.2.1 Sector break

The Mastering Order Form must indicate at which track sector B starts.
At index 00 of this track, the sector break will be made.
At least 6 SMPTE frames (± 1 DCC frame) before and after this timecode, the digital audio signal must be digital silence.
The PQ code for this point may not contain any offset.

2.2.2 Pre-pause before first track of Sector B

The time between the Sector break and the first track of Sector B is called "pre-pause".
This pre-pause is optional.
If such a pre-pause is defined, the minimum length is 6 SMPTE frames (± 1 DCC frame) **figure 1.**
Remark: The pre-pause must not be confused with the digital silence for the sector break (see 2.2.1).

2.3 Number of tracks and track numbering

Because of the split-up in sectors A and B, each sector shall contain at least 1 track.

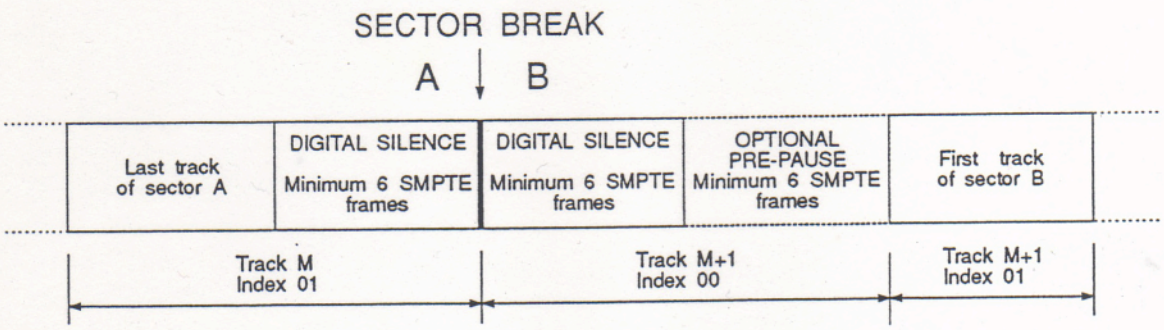
- Lowest track number: ≥ 1 (in case of sets, the first track number on sector A may be > 2).
- Highest track number: 99
- Tracks must be numbered continuously in ascending order.

2.4 Timecode

Timecode must be recorded on the DCC Tape Master:

- Timecode : SMPTE-timecode (non-drop frame)
- Recorded at: analogue track 2
- Standard: non-drop frame
- Sequence: continuous ascending
- Synchronisation: timecode synchronised to sampling frequency. timecode jumps not allowed.
- Recording level: 100 ± 50 nWb/m (0 dB VU ± 3 dB)
- The maximum value of the timecode is 99 minutes 59 seconds and 29 frames (the maximum playing time of a DCC is 90 minutes).

Figure 1



- If two tapes are required, the timecodes on these tapes do not need to be related.

2.5 Subcode information

Subcode information must be recorded on the DCC Tape Master, according to Philips/Sony agreement.

- Recorded at: analogue track 1
- Recording level: 100 ± 50 nWb/m (0 dB VU ± 3 dB)

2.5.1 PQ-cue code relation

The PQ-cue code is related to the programme and time code recorded on the DCC Tape Master(s).
The timecode offsets, as used for CD, can also be used for DCC.
There are 2 exceptions:

- the Track-Index no. indicating the sector break may not contain any offsets.
- it is not necessary that Track-Index 1-0 has a 1 second offset.
  Normal offset of 5 SMPTE frames is sufficient.

3 TEXT MODE

In a DCC package, text information must be included.
This text can be displayed on a variety of displays, e.g.:

- 1 line display;
- 2 lines display;
- 21 lines display.

The maximum number of characters per line is 40.
More details on TEXT MODE are given in PolyGram Document UGT-706.

4 DOCUMENTS TO BE SUPPLIED

4.1 Mastering Order Form

A MASTERING ORDER FORM is used for the preparation of DCC tape masters and DCC masters.
The recommended form of the Mastering Order is reproduced as Appendix 1, available under code no. 4922 000 26140 at the address mentioned in Para 5.
Alternatively a Label Copy (Label Information Sheet), provided it contains the necessary data, may be supplied instead of a Mastering Order Form.

4.2 PQ Printout

A printout of the PQ codes as generated by the PQ editor must be supplied with the DCC Tape Master.

4.3 Check list

A check list specifying the contents of a DCC Tape Master Set is included as Appendix 2.
This check list can be ordered under code no. 4922 000 26190 at the address mentioned in paragraph 5.

5 ADDRESSES

For general information concerning DCC Mastering:

PolyGram Record Service
Mastering Department
Erik van Doorne
P.O. Box 21200 ☎ +31 33 502924
3802 RE Amersfoort
The Netherlands Fax: +31 33 561305

Complete set as specified in Appendix 1:

PolyGram Record Service
Order Desk DCC
Siebe Minkes
P.O. Box 21200 ☎ +31 033 502912
3802 RE Amersfoort Telex: 43491 prsbv nl
The Netherlands Fax: +31 33 560931

For additional copies of this standard:

PolyGram International Music B.V.
International Standardisation
P.O. Box 23 ☎ +31 2154 19477
3740 AA Baarn Telex: 43400 phrc nl
The Netherlands Fax: +31 2154 16400

I verandering, in overleg met Erik van Doorne
19/8/92

DIGITAL dcc COMPACT CASSETTE

DCC MASTERING ORDER FORM

DIGITAL dcc COMPACT CASSETTE

Repertoire Owner	Planned release date
Name Department Date	**CATALOGUE NO.** UPC no. (12 digits) or EAN no. (13 digits) :
TITLE	**ARTIST(S)**
LABEL	Initial Order

Tape no. of		Tape(s) source
First track A	First track B	Mastering by
Last track A	Last track B	PQ-Coding by
Total playing time (A + B)		Text Mode edited by

TRACK INFORMATION

Track T-X	Track title Artist	Playing time	ISRC	Pre-Emph. Y/N	TXP	SMPTE-Ref. MM SS FF

Start lead-out

4922 000 26140

CHECKLIST TAPE MASTER SET

Catalogue Number: Title:

Label: Artist:

TAPE MASTER DATA (acc. to UGT-702)

Recording code	❒ AA	❒ AD	❒ DA	❒ DD	U-Matic	❒ 60 min.	❒ 75 min.	❒ min.
Sampling frequency	❒ 44.1 kHz		❒ 44.056 kHz		Pre-emphasis	❒ off ❒ on	❒ mixed (see Mastering Order Form)	
TIME CODE (Channel 2)	❒ yes	❒ no			SUB CODE (Channel 1)		❒ yes	❒ no

REMARK ON TECHNICAL QUALITY at TIME / TRACK / TIME CODE

Hum

Noise

Clicks

Distortion

Other

Improvement or correction required? ❒ yes ❒ no (if "yes" please contact the DCC order desk of PRS Amersfoort, The Netherlands

TEXT MODE DATA (acc. to UGT-706)

Floppy Disk: ❒ DD (double density 720 Kb formatted ❒ HD (high density 1,4 Mb formatted ❒ Print-out

OTHER DOCUMENTS

❒ Label Copy ❒ Mastering Order Form ❒ PQ Data sheet

Name: ..... Place and postcode: .....

Company: ..... Country: .....

Street: ..... Fax: .....

....

(Signature of recipient) (Date)

Name: ..... Tel.no.: ..... Fax.no.: .....

Comments .....

.....

DIGITAL dcc COMPACT CASSETTE

1 INTRODUCTION

Text mode is a feature of the DCC system which provides **visible information about the product.**

This information can be shown on e.g.:

- DCC-player display
- Display of remote control unit
- TV-screen
- etc.

The method of storage and the capability of the technique used is so versatile that the possibilities are almost unlimited.

2 TEXT MODE TOPICS (mandatory)

The information to be displayed is grouped into blocks of text called "TOPICS".

In order to provide the consumer with consistent information the following 4 topics are **mandatory**, which means the **information for TEXT MODE must be provided as part of the production material:**

- MAIN MENU
  - Topic 255 -
  The MAIN MENU provides an overview of the topics available.
- ALBUM WORK/TITLE
  - Topic 1 -
  This topic contains general information about artist, composer etc.
- TRACK LIST
  - Topic 2 -
  The TRACK LIST gives track related data such as:
  - track title
  - playing time
  - etc.

  It can be displayed when playing the current track but, dependent of the hardware, may also be used to scroll to other tracks which can be displayed and/or played.
- PERFORMER(S) NAME(S) AND CREDITS
  - Topic 3 -
  When a track is playing the PERFORMER(S) NAME(S) AND CREDITS topic displays detailed information about artist, composer, songwriter, etc.

3 TEXT MODE TOPICS (optional)

In addition to the 4 mandatory topics there is a large variety of topics to be displayed. A selection is given below, but when the DCC system is introduced TEXT MODE will obviously become a valuable tool for the creative designer.

- LANGUAGE SELECTION MENU
  - Topic 254 - (may also incorporated in Topic 255)
  The system offers the possibility of storing up to 7 different languages.
  If text is available in more than one language a language menu must be prepared in order to make selection possible.
  A decision to display text in more than one language implies that the information must be available for each topic.

  In case there is no translation available for a certain topic the system switches to DEFAULT = ORIGINAL language.
- SUNG TEXT (synchronuously with music)
  - Topic 9 -
  The system makes it possible to display the original lyrics simultanuously with the music.
- LINER NOTES
  - Topic no. = any free number between 1 and 255 -
  Information about the recording, music, artists etc.
- BIOGRAPHIES
  - Topic no. = any free number between 1 and 255 -
  This may be a biography of artist, composer etc.
- DISCOGRAPHY/BIBLIOGRAPHY
  - Topic no. = any free number between 1 and 255 -

All optional topics are displayed during actual track playing only (as happens with Topic 3).

4 TEXT PREPARATION

Text files for DCC Text mode must be prepared with specially developed software. Hardware necessary is based on IBM compatible computers.

4.1 Minimum requirements for hardware

- AT computer, IBM compatible (DOS 3.3 or higher);
- Colour monitor, preferably VGA or higher resolution;
- 3 1/2" Floppy Disk drive
  - Double density (DD) 720 KB or
  - High density (HD) 1.44 Mb
- Mouse;
- Printer.

4.2 Basic requirements for software

Text files for DCC must be prepared by means of a special software package developed by Philips Centre for Manufacturing Technology in Eindhoven The Netherlands.

This software package is called: CFT SCREEN EDITOR

The SCREEN EDITOR can be ordered under reference no. 8122 284 68320 at the address mentioned in Chapter 6.

4.3 Textfiles

For each DCC a floppy disk with the textfile prepared with the SCREEN EDITOR must be sent to the DCC Order desk at the address given in Chapter 6.

Minimum requirements:

- 3 1/2" Floppy Disk drive
  - Double density (DD) 720 KB or
  - High density (HD) 1.44 Mb
- Sticker with at least the following data
  - CATALOGUE NUMBER
  - ARTIST/TITLE
  - FILE NAME, a name of 8 digits with a 3 digit extension
    Example: **TEXTFILE.PIC**

Please refer to the DCC Checklist "TAPE MASTER SET" an Appendix to standard UGT-702.

5 TEXT DISPLAY

There are 3 possibilities:

- FULL SCREEN DISPLAY
  21 lines of 40 characters each, see ***Figure 1***
- TWO-LINE DISPLAY
  2 lines of 40 characters each, see ***Figure 2.***
- 12 CHARACTER DISPLAY/SINGLE-LINE DISPLAY
  The 12 character display has limitations as to the topic displayed i.e. only the mandatory topics are selectable see, ***Figure 3.*** Some DCC-players will have a scrollable single line display.

6 ADDRESSES

The CFT SCREEN EDITOR can be ordered at:

PHILIPS CONSUMER ELECTRONICS - KMG
Business Unit Mastering & Duplicating
Mr. Koos Middeljans
SAN 6 Building
P.O. Box 80002 ☎ +31 40 733455
5600 JB Eindhoven Fax: +31 40 736728
The Netherlands

For information about the application of DCC Text Mode please contact:

PolyGram Record Service
Mr. Eric van Doorne
Manager Mastering
P.O. Box 21200 ☎ +31 33 502924
3802 RE Amersfoort Fax: +31 33 561305
The Netherlands

For information about this or other PolyGram DCC standards please contact:

PolyGram International Music B.V.
Mr. Wout Natter
Manager International Standardisation
P.O. Box 23 ☎ +31 2154 19477
3740 AA Baarn Fax: +31 2154 16400
The Netherlands

Figure 1

Example of a full screen display

```
ROBERT PALMER "ADDICTIONS"  VOLUME 1

      1 BAD CASE OF LOVING YOU
        (DOCTOR, DOCTOR) 3.15
              2 PRIDE 4.05
      3 ADDICTED TO LOVE 4.21
            4 SWEET LIES 3.05
      5 WOKE UP LAUGHING 4.06
        6 LOOKING FOR CLUES 4.54
7 SOME GUYS HAVE ALL THE LUCK 3.06
          8 SOME LIKE IT HOT 5.05
        9 WHAT'S IT TAKE? 3.28
    10 EVERY KINDA PEOPLE 3.36
          11 JOHNNY & MARY 4.05
    12 SIMPLY IRRESISTABLE 4.18
            13 STYLE KILLS 4.16


            ISLAND 842 301-5
```

Figure 2

Example of a two-line display

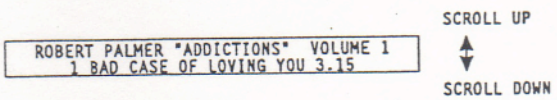
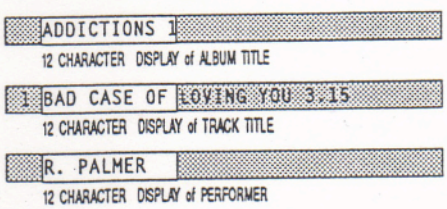


Figure 3

Example of a single-line display and a 12 character display



DIGITAL DCC COMPACT CASSETTE

1 SCOPE

These explanatory notes summarize the DCC Mastering Process.
It describes the working of the DCC mastering equipment and the influence of the layout of the DCC Tape Master on this process.
From the start of DCC, the goal was to use CD Tape Masters for DCC production as well. Recent experience shows that this is not always possible as will be explained here.
During the past few months, comments received on the content of the DCC Specification Kit made it clear that on some points clarification is necessary. In case of further queries please contact one of the specialists mentioned in Chapter 7.

2 DCC MASTERING PROCES

DCC mastering is the combined action of converting audio data on the DCC Tape Master into the DCC audio format (PASC), merging audio and Textmode data, and writing the output on tape. The result is a "DCC Master", a normal DCC cassette.
In the DCC high-speed duplication process, copies are "cloned" from a DCC Master. DCC Masters are therefore identical to normal pre-recorded DCC cassettes.
The following two elements are needed for DCC mastering:

- DCC Tape master(s), as standardized in UGT 702, see 2.1.
- DCC Textmode file, as standardized in UGT 706, see 2.2.

2.1 DCC Tape master

A DCC Tape master can be one or two U-matic cassettes, written in PCM 1610/1630 format.
Similar to CD Tape masters, PQ data must be provided. This PQ file must be written on the U-matic tape.

2.2 DCC Textmode file

A DCC Textmode file must be supplied on a floppy disc. All 3,5 inch floppy disk formats (DOS compatible) are accepted.
IMPORTANT:
Some computers can format Double Density (DD) floppy disks for High Density (HD), and vice versa. Floppies formatted thus, can not be processed in the DCC mastering equipment. Make sure that the floppy is **formatted** as HD when the floppy disk is identified as HD; and as DD when it is identified as DD.

Contents

2.3 DCC Mastering equipment

The DCC Mastering Unit consists of three main parts:

- Computer, controlling the mastering proces. During the mastering proces, it also generates the Textmode data to be written on tape, and the data for the so-called AUX channel (this channel contains track and timing information).
- U-matic PCM 1630 playback set. Because the PASC encoder only accepts the audio information in the AES/EBU format, the PCM 1630 is equipped with a DO board.
- PASC electronics, the DCC recorder electronics and miscellaneous electronical circuits, in a standard 19" rack.

The DCC mastering process is computer controlled. Once the controlling computer has found all relevant data it needs to make a DCC Master, the process is automatic (except when two U-matic tapes are used to make one DCC Master).

3 BUILD-UP OF A DCC MASTER

Although the aim was that DCC should function like CD, it is inevitable that differences occur. Since the DCC format is a cassette format, using an auto-reverse system, the cassette has two "sides" which are called "sectors", A and B.
The musical programme on the DCC Tape master is divided over both sectors, for an efficient use of DCC tape.
During mastering, each sector is treated like a complete musical programme. The DCC format also knows a so-called "lead-in" and "lead-out". Both sector A and B are therefore preceded on tape by a lead-in, and end with a lead-out.
During mastering, when sector A is completed, sector B is written in the reverse direction of sector A (see **Figure 1**).

Figure 1: build-up of a DCC Tape Master

Lead-in A	Musical programme Sector A	Lead-out A
Lead-out B	Musical programme Sector B	Lead-in B

Figure 1 shows an exceptional case, namely the musical programme of sector A having the same playing time as sector B.
Lead-in and lead-out usually last 10 to 30 seconds, the musical programmes can have lengths up to 45 minutes.

3.1 DCC Frame rate

The DCC master has its audio data divided in frames. The difference with a U-matic tape is, that the frame-rate is approximately 5 times lower. Rounded off, the DCC Master has a frame-rate of 6 frames per second. The DCC Master also contains a "timecode", with a frame-rate of 6 frames per second. The length of a sector on the DCC Master can be measured in frames. If two sectors have the same length, they have the same number of frames.

3.2 Basic principles of the DCC format

Some basic principles of the DCC format (see also figure 1):

- the start of the lead-in for sector A coincides with the end of the lead-out for sector B.
- the end of the lead-out for sector A coincides with the start of the lead-in for sector B.
- the length of the lead-out for sector A is the same as the length of the lead-in for sector B.
- Sector A and Sector B always have the same number of frames, and therefore have the same length.

3.3 Different playing time per sector

Figure 2 shows the build-up of a DCC Master when Section A is longer than B.

Figure 2: Sector A longer than B

Lead-in A	Musical programme Sector A	Lead-out A
Lead-out B	Musical programme Sector B	Lead-in B

The difference in playing time is compensated with a longer lead-out of sector B, and not by a shorter lead-in of sector A, because the lead-in of sector A can never be shorter than a pre-defined length. This length is stored in a computer file, amongst other values, containing defaults for the DCC Masters.

Figure 3 shows the build-up of the DCC Master where the difference in playing time is compensated by a longer lead-in of sector A, and not by a shorter lead-out of sector B. Here, the default minimum for the lead-in of sector A is used as a minimum length for the lead-out of sector B.

Figure 3: Sector A shorter than B

Lead-in A	Musical programme Sector A	Lead-out A
Lead-out B	Musical programme Sector B	Lead-in B

3.4 Consequences for consumers

From a consumer point of view a longer playing time for Sector B (see Figure 3) is not desirable. This is caused by the way a DCC player functions.
A high-speed copy is placed in a DCC player whilst the cassette is re-wound to the start of sector A (a pre-recorded DCC cassette leaves the DCC Duplicating Plant this way). The player starts from this position and detects from the signals on the DCC cassette that it is at the start of the lead-in of sector A. The player calculates the fastest way to go to the first track after the lead-in. Depending on the length of the lead-in, it may decide that it reaches this point fastest in "fast-forward" mode. The consumer will then be confronted with a player that goes fast-forward, instead of the selected play function.
This confusing behaviour of pre-recorded DCC cassettes can be avoided by making the playing time of sector A longer than the playing time of sector B.

In this case the lead-in for sector A will be reduced to its minimum size, with the shortest access time to the first track via the "play" mode.

3.5 Audio signal during lead-in and lead-out

During lead-out and lead-in, the audio signal on the DCC Master is filled with digital silence. This is done by the controlling computer and creates an important difference between the DCC Tape master and a CD Tape master.

3.6 Sector break

The point where the musical programme is split-up into two parts is called the "sector break".
In "play" mode, the performance around the sector break of the first DCC player will be as follows:

- when the end of the last track of sector A is reached, the DCC player will detect the lead-out for sector A and the player stops.
- the playback/recording head is retracted from the tape and rotates 180° so that sector B can be played.
- the playback/recording head is placed against the tape and the player starts again.

This happens within a short period of time, even within 1,5 seconds. Simultaneous with the retracting of the playback/recording head from the tape, there is a "mute" in the audio signal during the sector break. Later generations of DCC players may have buffer memories to eliminate this effect, but the first players will not have this feature.

4 PQ CODING

4.1 PQ coding for DCC

The DCC Tape master must contain PQ data as is the case with CD Tape masters.
The PQ data give the relation between the timecode on the U-matic tape, and the contents of the musical programme by means of "track-index numbers". Every track has its own track number, and its beginning and end are identified by means of an "Index 1" respectively "Index 0" point. Together they form the track-index number.
The highest track number allowed is 99, the lowest is 1. It is not mandatory to start a PQ file with track number 1.
Apart from the use of "Index 0" for pause and "Index 1" for beginning of music, higher index numbers may be used to indicate subdivisions of a track. The highest possible index number is 99. Index numbers higher than 1 are also called "sub-index numbers".

4.2 Pause in audio signal

An "index 0" point determines the beginning of a pause in the audio signal, and not the beginning of a track, e.g. track-index number 1-0 indicates the beginning of the pause before track 1.

4.3 Start lead-out

The end of the musical program is indicated by the so-called "start lead-out", which does not have a track-index number.

4.4 PQ printout

In the header of the PQ printout (see **Appendix 1**), additional information can be given which is stored in the PQ data on the DCC Tape master. A few PQ editors can not print out this information, or even write this information on the Tape master. Then the only available PQ information on a DCC Tapemaster is the track-index numbers, start lead-out and the corresponding timecode values.
IMPORTANT:
The PQ data also contain identifying information for the Repertoire Owner such as:

- UPC/EAN number (Barcode number);
- Catalogue number;
- Label;
- Main Title;
- Main Artist;

and on track level:

- Track title;
- IRSC, a code identifying the track for collecting of a.o broadcast income when Digital Broadcasting starts.

It is strongly recommended to check whether your version of the PQ editor can provide this information.

4.5 PQ coding and calculation of the sector break

As described in Chapter 3, the musical programme on the DCC Tape master must be split in two sectors. The position of this sector break can be determined in two ways:

- Automatically
  When a mastering session is started, the controlling computer reads the PQ data on the DCC Tapemaster first. From this PQ file all track timings can be calculated and the mastering equipment can derive the optimal sector break. The optimal sector break gives the shortest length of DCC tape needed for a DCC Master. As a result of this a high-speed copy made from this DCC Master has the shortest possible tape length.
- Manually
  Before a DCC mastering session is started, the controlling computer can be "told" which track is the first track on sector B. This is done via the computer keyboard.

The disadvantage of manually controlling the sector break for a DCC Master, is that in programming the sector break, errors can be made. The disadvantage of automatic calculation of the sector division by the DCC mastering computer, is that the position of the sector break may be unknown until mastering takes place. Since the sector break introduces a mute during playback, it may be important to know the place of the sector break in advance.
It is of course possible to calculate the place of the sector-break before the mastering session. The position of the sector break depends on the playing times of the tracks on the musical program. It can be calculated as follows:

- Substract the timecode for "track index 1-1" from the timecode of the "start lead-out" and divide the outcome by two.
- Add to this result the timecode of "track-index 1-1", this gives the timecode value indicating the excact middle of the musical programme.
- Choose the nearest "index 0 point" to this excact middle of the musical programme. This point is currently the sector break calculated by the mastering computer.

4.6 Calculation procedure PolyGram Record Service

As it may be expected that different versions of the Mastering Equipment will become available (customized versions) the result of an automatic calculation of the sector break may be uncertain.
Polygram Record Service has decided to use the following procedure:

- the position sector break is programmed manually.
- this sector break must be provided by means of a remark in the PQ file.
- the Labelcopy and Mastering Order provided with the DCC Tape Master must indicate the position of the sector break.

4.7 Track and index numbering on the DCC Master.

The DCC Master has track and index numbers which are the same as those programmed in the PQ data. The presence of track and index numbers makes programming and track search possible. The track and index numbers are recorded in the AUX channel of the DCC Master.
Track and index numbers are also used by the Textmode decoder, to perform track related functions.

4.8 PQ timecode offsets and pause before track 1

The offsets for CD can also be used for DCC with one exeption, namely the track-index number for the first track of sector B. This timecode may not contain any offset.
The pause before track one can be as short as desired, even zero frames.

This is different from CD, where it is common to have a pause before the first track of 2 to 3 seconds. The offset for this track can be shortened to an offset as used for all other tracks (e.g. 5 frames)

5 SECTOR BREAK

5.1 DCC Mastering process in relation to the sector break

As explained in paragraph 4.5 the sector break is determined manually in order to let sector B start with the desired track.
Steps in the mastering process:

- Before the mastering session starts, the first track of sector B is programmed.
- The PQ code is read from the DCC Tape master. If no PQ code is found, the mastering session is stopped.
- After the PQ code is read, the Textmode information is read from the floppy disk.
- At this point, the UPC/EAN number in the PQ file is checked against the PQ code in the Textmode file. If the two numbers do not match exactly, an error message is given and the mastering session is stopped.
  It is therefore important that both PQ and Textmode files have a correct UPC/EAN number.
- After giving the final OK , the mastering session is started.
- The mastering equipment starts recording Sector A. It records the audio programme from "track-index 1-1" onwards. The controlling computer continuously reads the timecode from the DCC Tapemaster. The timecode is compared with the PQ code, and if necessary a new track-index number is recorded on the DCC Master.
- As soon as the controlling computer detects the timecode value that belongs to the sector break, it starts writing "lead-out" for sector A on the DCC Master. Also "digital silence" is inserted in the audio signal on the DCC Master. This digital silence is generated by the controlling computer. As a consequence, the audio signal on the DCC Tape master must be digital silence, otherwise the "hard mute" from the DCC mastering equipment may result in audible "clicks" or "scratches".
- When the end of the "lead-out" is reached, the DCC mastering stops recording. The playing direction of the recording deck is changed, the U-matic recorder is rewound, and the controlling computer starts recording "lead-in" for sector B. As soon as the timecode value indicating the sector break is reached, sector B is recorded. This implies that the entire audio programme on the DCC Tapemaster is recorded from "track-index 1-1" to "start lead-out" of the PQ code.

When this point is reached, the controlling computer starts recording "lead-out" for sector B. After this is completed, the DCC mastering session is finished, and the DCC Master is ready.

5.2 Digital silence for the Sector break

Because the DCC system works with a frame rate of approx. 6 frames per second, the timecode value and PQ code are compared approx. every 5 SMPTE frames.
This implies that there is a tolerance in the accuracy of DCC compared with the DCC Tape master of maximum 6 SMPTE frames.
As a consequence, the digital silence must start at least 6 SMPTE frames **before** the track-index number indicating the sector break, and **cannot end before 6 SMPTE frames** after this PQ code. The minimum length for the digtal silence at the sector break must therefore be 12 SMPTE frames.
Note:
Using an offset for this point destroyes the use of the 6 frames digital silence before and after the sector break.

5.3 Pre-pause

If the first track of sector B is called track N, the time difference between track-index number N-0 and N-1 is called the "pre-pause" because it is a pause at the beginning of a new sector.
This (optional) pre-pause is not counted in the playing time of the first track on sector B, and is not played during a programmed replay of the audio programme (as is the case with every other pause).
The recording of a pre-pause can be avoided, by giving the two track-index numbers the same timecode value (in the PQ code) similar to any other pause, where the same effect can be achieved.
Often, the pre-pause is confused with the digital silence for the sectorbreak. The only connection between the two is the fact that the beginning of the prepause is the track-index number indicating the sectorbreak.

6 SUMMARY

6.1 Information written on the DCC Master

- Audio programme (copied and PASC encoded from the DCC Tape master from "track-index 1-1" to "start lead-out").
- Textmode information (copied from the Textmode floppy, and dependant on the topic, recorded on certain tracks or timecodes, or throughout the entire DCC Master).
- Track-index numbers (copied from the PQ code).
- UPC/EAN number (copied from the PQ code).
- ISRC numbers (copied from the PQ code).
- Figure 4 gives the lay-out of 1 U-matic tape for Sectors A and B (see next page).
- Figures 5 and 6 (see next page) give the lay-out of respectively aseparate U-matic tape for Sector A and a tape for Sector B, combined these tapes form a DCC Tape Master set.

7 ADDRESSES

For general information concerning DCC Mastering:
PolyGram Record Service
Mastering Department
Erik van Doorne
P.O. Box 21200 ☎ +31 33 502924
3802 RE Amersfoort
The Netherlands Fax: +31 33 561305

Dispatch address for DCC production parts:
PolyGram Record Service
Order Desk DCC
Siebe Minkes
P.O. Box 21200 ☎ +31 033 502912
3802 RE Amersfoort Telex: 43491 prsbv nl
The Netherlands Fax: +31 33 560931

For additional copies of this standard:
PolyGram International Music B.V.
International Standardisation
P.O. Box 23 ☎ +31 2154 19477
3740 AA Baarn Telex: 43400 phrc nl
The Netherlands Fax: +31 2154 16400

(continued next page)

Figure 4: Lay-out of a U-matic tape for Sectors A and B

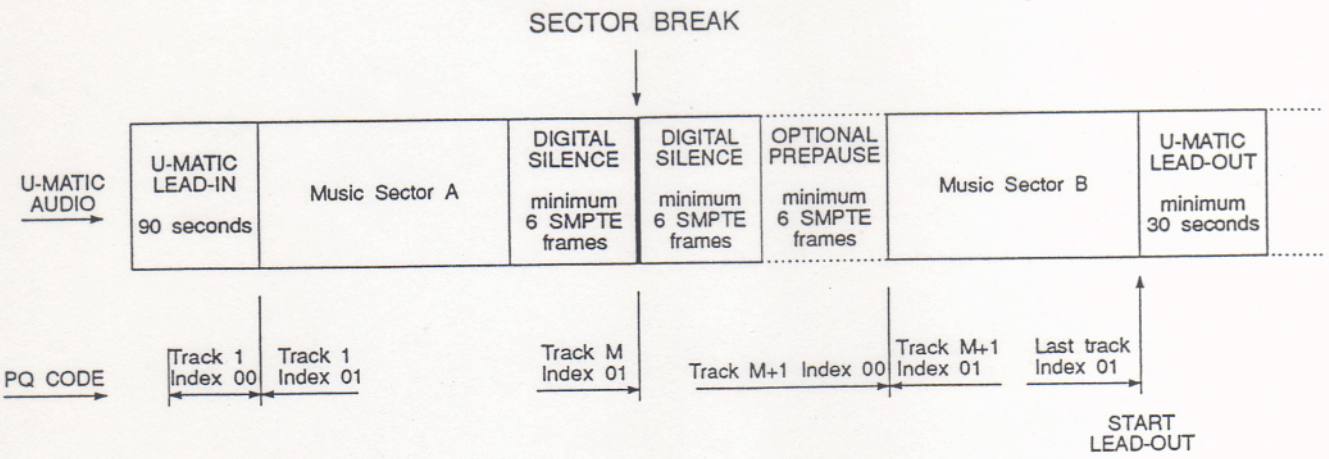


Figure 5: Lay-out of separate U-matic tape for Sector A (to be combined with tape for Sector B)

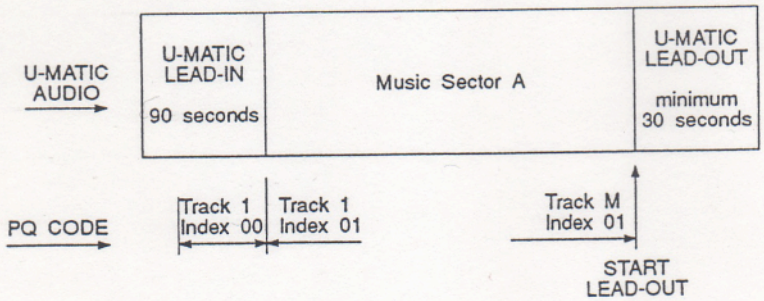
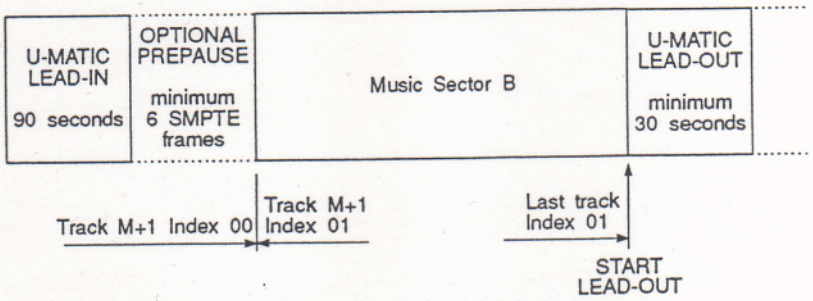


Figure 6: Lay-out of separate U-matic tape for Sector B (to be combined with tape for Sector A)



PolyGram

POLYGRAM INTERNATIONAL MUSIC B.V.

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Direct 726

Our ref: BA-157-930607

Date: 1993-06-07

Subscribers of UGT-700
Specification Kit

Enclosed please find a revision of the standard UGT-705 " Printed Matter for PolyGram Standard products -DCC-" .

This standard is a part of the Specification Kit and you are kindly requested to destroy the old version dated 1992-05-29 and put this new version in your binder.

The standard has been changed on the points;

- the width of the DCC-booklet has been changed from 64-0,2 into 65-0,2 mm
- drawings of Cover Card, Inlay Card, reverse of the Inlay Card and Booklet has been changed completely
- dead racking card has been extended

With kind regards,

Anne-Marie Hopman
International Standardisation

1 SCOPE

This standard gives requirements for the printed matter of PolyGram branded Digital Compact Cassettes, in abbreviated form DCC. It also provides a checklist which may prove useful to ensure completeness of the films for DCC packaging.

Dimensions are given in millimetres.

2 DCC LOGO

The registered form of the Digital Compact Cassette:

2.1 Colour

The DCC-logo may be used in every colour. Different colours may not be used in the same logo.

2.2 Negative and positive

In case a positive or negative version of the DCC-logo is used the background colour and intensity must be uniform across the entire logo.

Shadows and/or graphic effects are not allowed.

2.3 Clear zone

The DCC-logo must be used on its own and free standing.

A clear zone of at least the height of the stylized letter C of DCC must be maintained between the DCC-logo and other graphical or textual elements. The DCC-logo may not be enclosed in any kind of box or frame nor may any text, slogan etc. be added.

Contents

2.4 Size

The DCC-logo may be reduced or enlarged on condition that the same relative positions and proportions between the respective elements are maintained and that the DCC-logo is always legible.

2.5 Standard film

A positive film or photo-mechanical transfer (PMT) can be ordered under code number 4922 000 23850 at the address mentioned in paragraph 19.

CHANGES WITH RESPECT TO PREVIOUS EDITION (1992-05-29)

- the required accuracy of DCC Printed Matter makes it necessary to standardize the whole process - from Artwork via Colour Separations to finished Printed Matter -.
  A special GRID FILM with the Dead Racking Card (dated 1993-05-19) has been developed and is now part of the standard. Copies of this film can be ordered at the address mentioned in paragraph 19.
- the width of the DCC-booklet has been changed from 64 -0,2 into 65- 0,2 mm.
- Drawings of Cover Card, Inlay Card, reverse of the Inaly Card and Booklet has been changed completely.
- the procedure for supplying films to PRS Amersfoort The Netherlands has not been changed:
  All production parts for DCC must be sent to DCC Order Desk (Siebe Minkes full address given in Appendix 1 to this standard).

3 PRINTED MATTER

The 4 main components of DCC printed matter are;

- cover card
- inlay card
- booklet (cover)
- dead racking card

The accuracy required for the finishing of these components can only be achieved through a standardized process.

A special GRID FILM has been developed; on this film the 4 components have fixed positions to ensure that the tolerances laid down in this standard can be met.

A reprint of this film is included as Appendix 2.

All films for DCC must be prepared on the basis of the lay-out of this film; separated films make it necessary to combine them locally which leads to delays and increases the risk of errors.

Copies of this film can be ordered at the address mentioned in paragraph 19 under ref. no.: 4922 000 26160.

4 COVER CARD

The requirements of the COVER CARD are given in **Figure 1**, which also shows the elements to be printed on the COVER CARD.

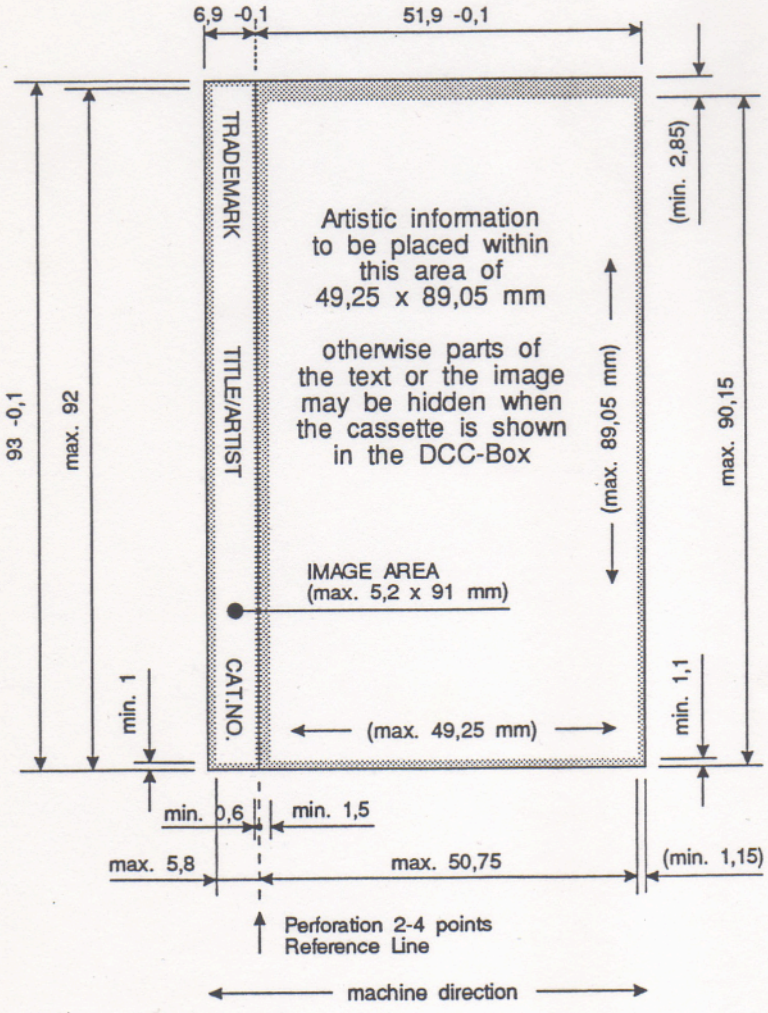
4.1 Paper Quality

150 - 170 g/m^2, Machine coated, single or double sided.

4.2 Standard Grid (film)

A standard combined grid can be ordered under code number 4922 000 26160 at the address mentioned in paragraph 19.

Figure 1



Important:

Due to tolerance variations between the cover image and box-aperture (or window), it is recommended to treat this shaded area of the cover card (and the corresponding artwork) as "bleed area". All important images/text should fall within the area shown.

5 INLAY CARD

The dimensions of the Inlay card are given in **Figure 2**, which also shows the elements to be printed on the Inlay Card. The positioning of the elements is free.

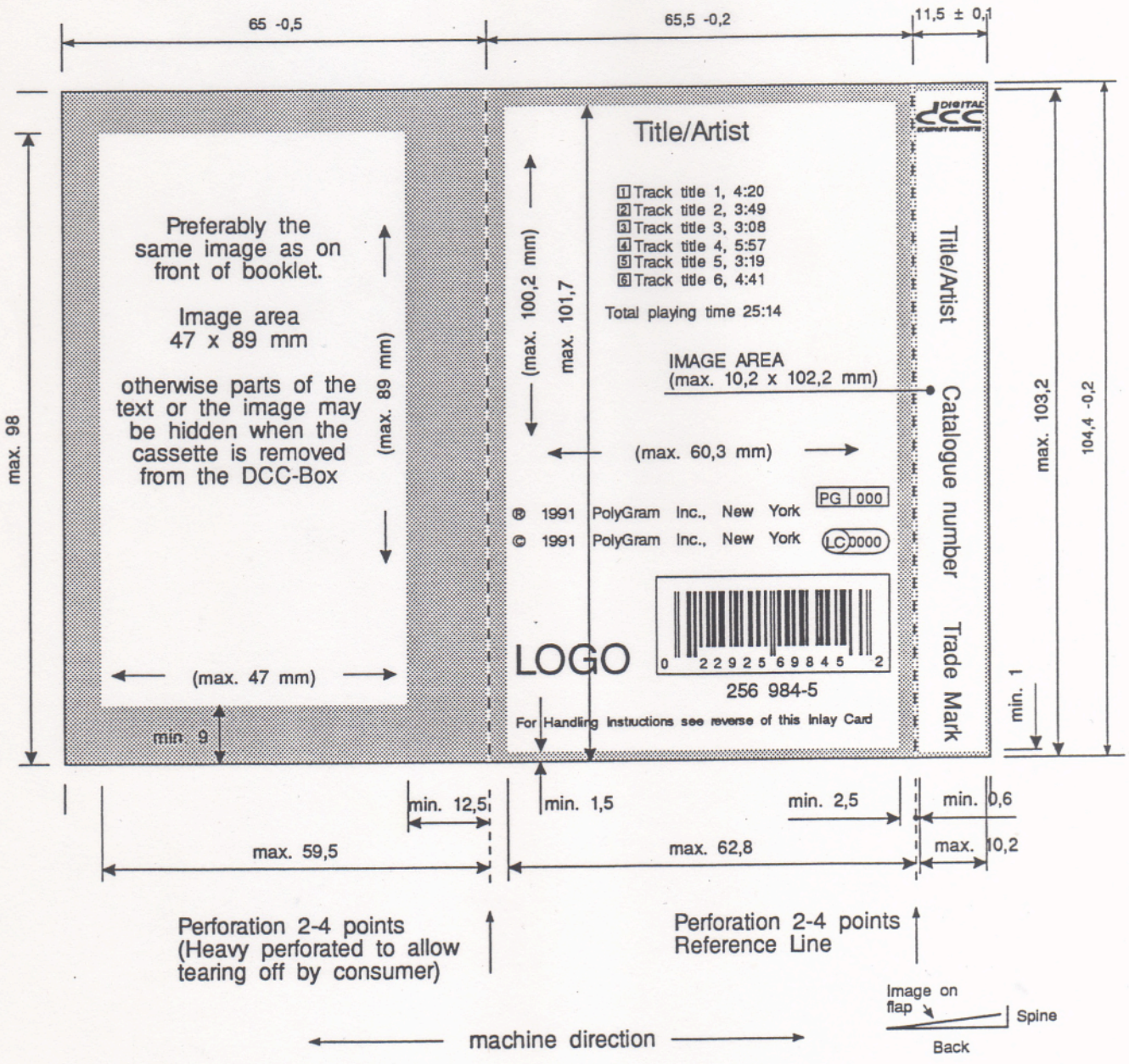
5.1 Paper Quality

150 - 170 g/m^2, Machine coated, single or double sided.

5.2 Standard Grid (film)

A standard combined grid can be ordered under code no . 4922 000 26160 at the address mentioned in par. 19.

Figure 2



6 SPINE OF THE INLAY CARD

6.1 Catalogue number

New Product Code (NPC) according to standard UGT-213.

Example: 510 192-5
last digit 5 = configuration code for DCC

6.2 DCC Logo

See paragraph 2. It is **mandatory** to place the logo on the spine. Size and positioning are free.

6.3 Main title and/or artist

6.4 Trade mark

The trade mark as registered by the owner of the product.

7 BACK OF THE INLAY CARD

7.1 Barcode

The UPC barcode has been standardised for PolyGram. See **Figure 3** for further details.

7.2 Catalogue number

New Product Code (NPC) according to standard UGT-213.

7.3 © Notice

Protects the copyrights of the ARTWORK.
Example: © 1991 Phonogram Ltd., (London).

7.4 DCC Logo

See paragraph 2. It is **recommended** to place the DCC logo on the back of the Inlay Card.

7.5 French Price Code

On DCC a french price code must be present on the back of the Inlay Card:
Example:

BA 000

The code is placed in a box with a length of max. 10 mm. For a survey of French Price Codes see UGT-658.

Since the retail price of the DCC is not yet known it is recommended to put "000" on the film. When the price has been decided the relevant French Price Code will be inserted in the black film.

7.6 German Label Code

The label code is a national code (GVL) in Germany to identify the label for the collecting of radio and television broadcasting fees. The code is printed in a standardised way:

Fontana (LC 0211)

The minimum length of the logo is 9 mm [0.354"], type size 6 points. Label codes for the major PolyGram labels can be found in Standard UGT-214.

Exception: It is allowed to omit the code on the back of the Inlay Card.

7.7 Ⓟ Notice

The Ⓟ Notice lays down:

- the year of first release of a SOUND recording by
- the owner, or his successor in title, of this particular sound recording.

When different SOUND recordings with different years of first release are coupled, each individual year of first release, including the owner, or his successor in title, must be stated.

Example:

Ⓟ 1991, 1,2,3 PolyGram Records Inc., (New York).

Ⓟ 1990, 4 PolyGram International Music B.V., (Baarn)

7.8 Total playing time

Example: TOTAL PLAYING TIME 50 : 32

7.9 Track titles/numbers/timings

1 Track title 4:46

2 Track title 3:42

Figure 3

BARCODE INFORMATION

It is recommended to print the barcode at least 5 mm from the edges in black on a white background; the area for this white background is 36 x 15 mm:

The positioning is free but it is recommended to place the barcode in the bottom right hand corner.

If the design makes the use of a white background disturbing please make sure to include the barcode in the floating fifth (black) film.

Magnification factor of the symbol: 0,85
Height of the symbol : 50 % truncated
Further technical data of the UPC Barcode can be found in Standard **UGT-290.**

Important: an other barcode system is called EAN. (EAN = **E**uropean **A**rticle **N**umber).

Main difference is the fact that it is has 13 digits. Under no circumstance may a PolyGram 7 digit catalogue number be integrated into a digit EAN number. Products with such a barcode may be rejected by retailes.

7.10 Trade mark

The trade mark as registered by the owner of the product.

8 FLAP OF THE INLAY CARD

The flap of the Inlay Card (see **Figure 2** on page 3) is designed to allow display of the DCC-Box whilst cassette and booklet have (temporarily) been removed by the retailer, the so-called "Dead Racking".

The flap will be folded back and heavily perforated to allow tearing off by the customer making the information on the reverse of the Inlay Card visible.

9 REVERSE OF THE INLAY CARD

The area shown in **Figure 4** is free for promotional use or may be used for Handling Instructions (see **Figure 5**).

If no specific film is supplied these Handling Instructions will be printed here.

Remark:

Both DGG and Decca use the DCC

4 language note.

10 BOOKLET

The dimensions are given in **Figure 6.**

Thickness on the folding side max. 1,65 mm (thickness of paper and staple, including the dead racking card).

Films must be provided with page numbers, preferably within the text area.

10.1 Paper quality

COVER:	150 - 170 g/m^2, Machine coated, single or double sided.
INNER PAGES	between 50 and 70 g/m^2 depending on number of pages.

For more details see **Figure 7.**

10.2 Stapling

The booklets are stitched with a staple of max. 0,404 mm diameter (AWG 26).

10.3 Standard Grid (film)

A standard combined grid can be ordered under code number 4922 000 26160 at the address mentioned in paragraph 19

Figure 5

THE DIGITAL COMPACT CASSETTE SYSTEM offers superior sound reproduction on a small, convenient sound carrier. The DCC is excellent performance is the result of advanced digital coding on magnetic tape.

TEXT MODE: DCC incorporates a completely new feature providing VISUAL PRODUCT INFORMATION. This information can be displayed when the DCC player is equipped with LCD (liquid crystal display) or connected to a television set.

LOOKING AFTER YOUR DIGITAL COMPACT CASSETTE:
To maintain the high quality of this DCC, please
- keep the metal tape protector closed to prevent possible damage to the tape.
- avoid exposing the cassette to heat or strong magnetic fields.

DAS DIGITAL COMPACT CASSETTE SYSTEM bietet überragende Tonqualität auf einem kleinen, handlichen Tonträger. Die außergewöhnliche Qualität der DCC ist das Ergebnis modernster Digital-Kodierung auf Magnetband.

TEXT MODE: Als absolute Neuheit bietet DCC VISUELLE PRODUKT-INFORMATIONEN. Diese Informationen können sichtbar gemacht werden, wenn der DCC-Player über eine Flüssigkristall-Anzeige (LCD) verfügt oder an einen Fernseher angeschlossen ist.

HINWEISE FÜR DEN SORGFÄLTIGEN GEBRAUCH IHRER DCC: Die hohe Qualität der DCC ist dauerhaft gewährleistet, wenn
- der Metallschieber zum Schutz des Bandes geschlossen bleibt.
- Hitze und starke Magnetfeld-Einflüsse vermieden werden.

LE SYSTÈME DE LA CASSETTE COMPACTE NUMÉRIQUE (Digital Compact Cassette System) permet une restitution sonore optimale sur un support commode par ses petites dimensions. L'excellente qualité de la Cassette Compacte Numérique (DCC) provient de l'utilisation d'une technique numérique de pointe sur bande magnétique.

TEXT MODE : Les cassettes DCC introduisent des données totalement nouvelles offrant des INFORMATIONS VISUELLES. On peut accéder à ces informations si le lecteur de cassettes DCC est equipé d'un écran à cristaux liquides (LCD) ou s'il est connecté à un poste de télévision.

CONSEILS POUR CONSERVER VOS CASSETTES COMPACTES NUMÉRIQUES (DCC)
Pour maintenir la haute qualité de cette cassette DCC
- conserver fermée la protection métallique afin d'éviter d'éventuels dommages sur la bande ,
- éviter d'exposer la cassette à la chaleur et à des champs magnétiques puissants.

IL SISTEMA DIGITAL COMPACT CASSETTE offre, mediante il suo supporto di piccole dimensioni e di grande comodità, una riproduzione sonora di qualità superiore. Le eccellenti prestazioni della DCC sono il risultato di una avanzata tecnologia digitale su nastro magnetico.

TEXT MODE: La DCC incorpora una novità assoluta che permette di leggere l'Informazione Visiva sul Prodotto (VISUAL PRODUCT INFORMATION). Questa informazione può essere attivata purchè si disponga di un riproduttore equipaggiato di visualizzatore a cristalli liquidi (LCD) oppure collegato a un televisore.

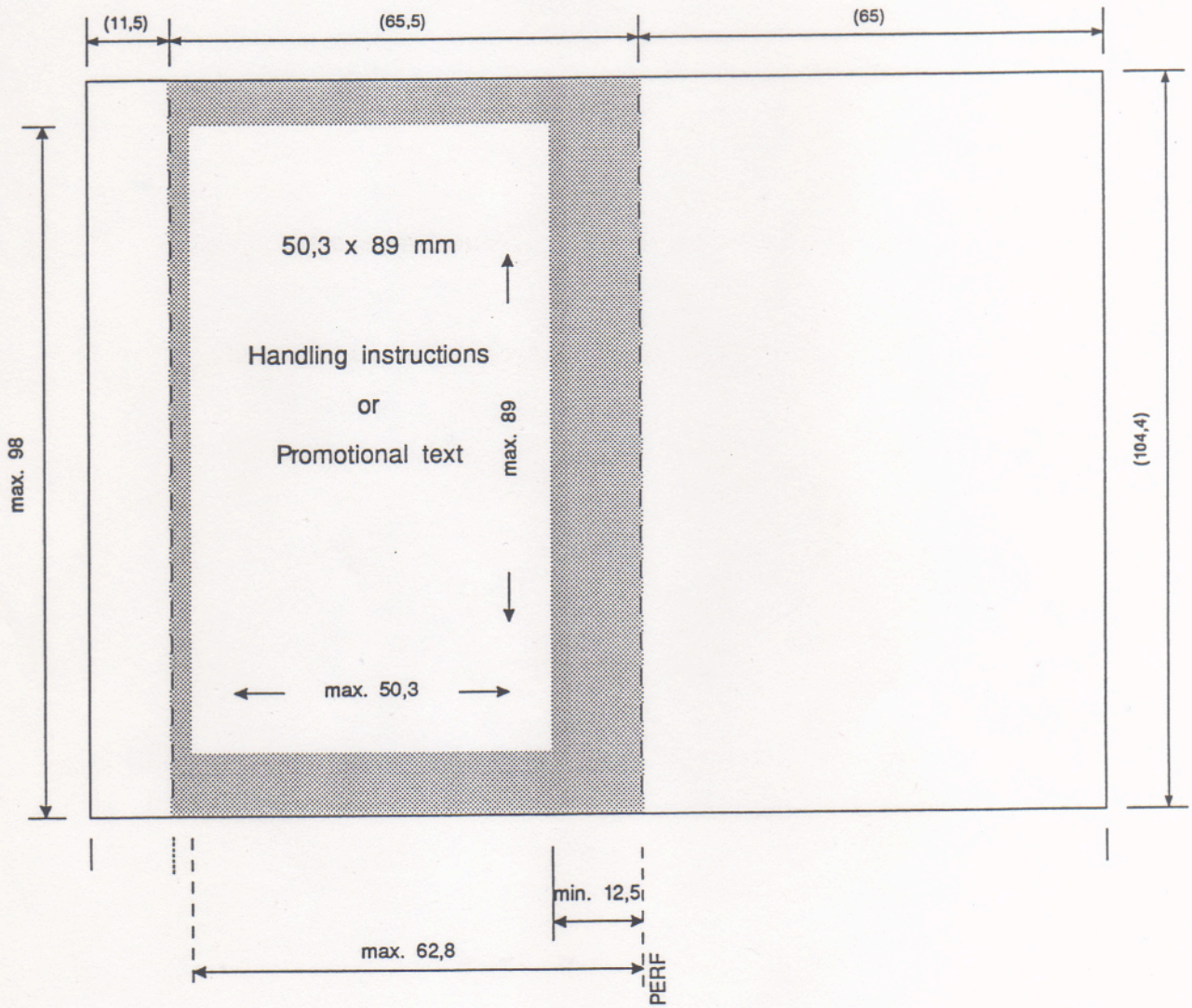
AVVERTENZE: Per mantenere l'alta qualità di questa DCC è necessario:
- mantenere la protezione metallica del nastro chiusa per prevenire danni accidentali.
- evitare l'esposizione della cassetta alle fonti di calore e a forti campi magnetici.

EL SISTEMA DE DIGITAL COMPACT CASSETTE ofrece una calidad acústica soprendente sobre un soporte de dimensiones reducidas y muy manejable. La extraordinaria calidad del sistema DCC es el resultado del más moderno procedimiento de codificación digital sobre cinta magnética.

MODO TEXTO: La DCC incorpora una novedad absoluta al ofrecer INFORMACIONES VISUALES. Dichas informaciones pueden visualizarse si el propio aparato DCC tiene una pantalla de cristal líquido (LCD) o se conecta con un televisor normal.

INDICACIONES PARA EL USO CORRECTO DE LAS CINTAS DCC: Para obtener permanentemente el elevado nivel de calidad del sistema DCC es imprescindible tener en cuenta las indicaciones siguientes:
- mantener siempre cerrado el cursor metálico de protección de la cinta;
- evitar la acción del calor y de campos magnéticos fuertes.

Figure 4



11 FRONT OF THE BOOKLET COVER

It is recommended to repeat the artistic information on the Cover Card.

12 BACK OF THE BOOKLET COVER

Identical to back of Inlay Card.

It is recommended to repeat the information given on the back of the Inlay Card; except the Barcode.

13 INSIDE OF THE BOOKLET COVER

If the Handling Instructions are not printed on the reverse of the Inlay Card the Handling Instructions should be printed on the last page of the booklet cover.

For text see **Figure 5.**

Figure 6

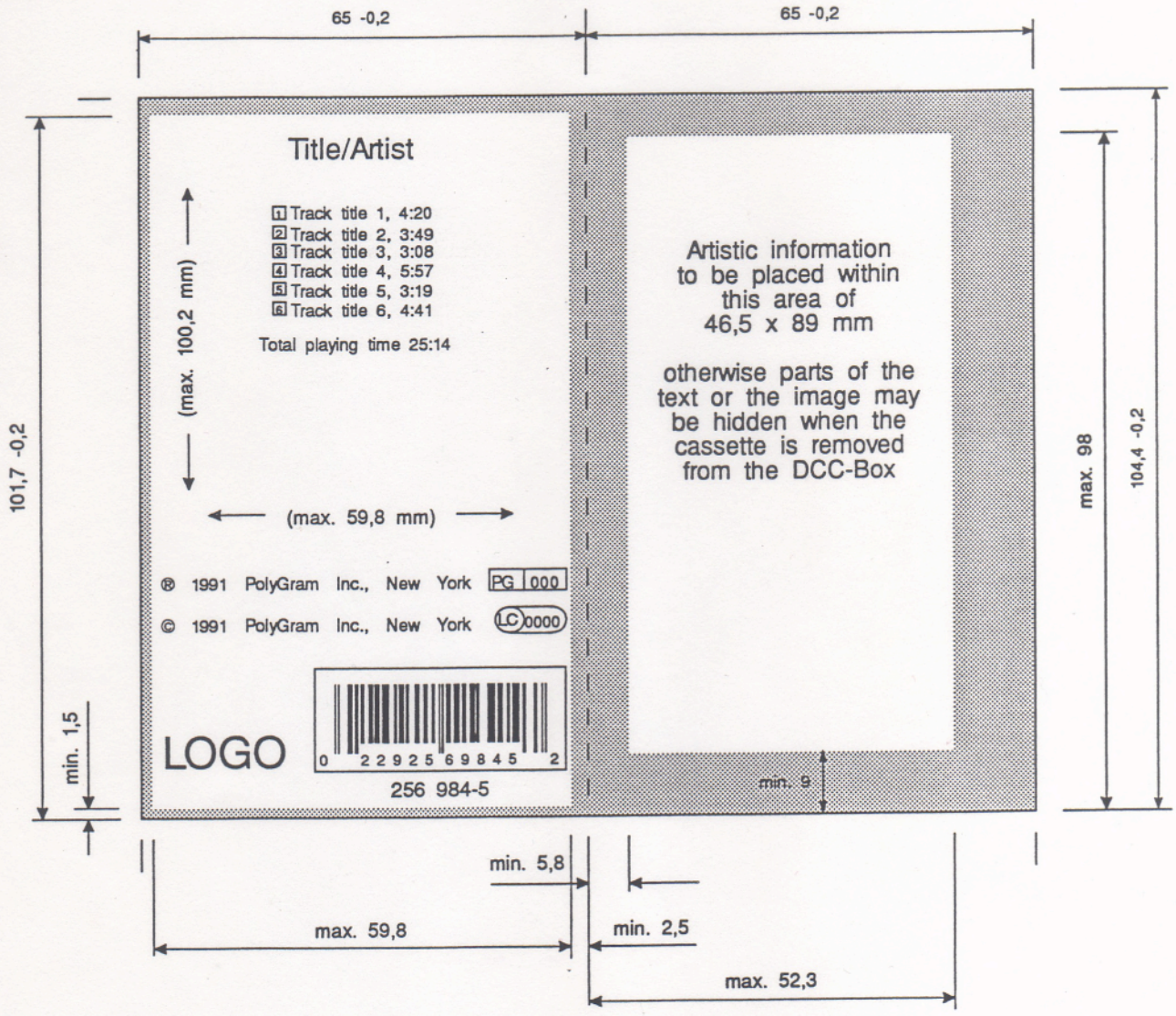
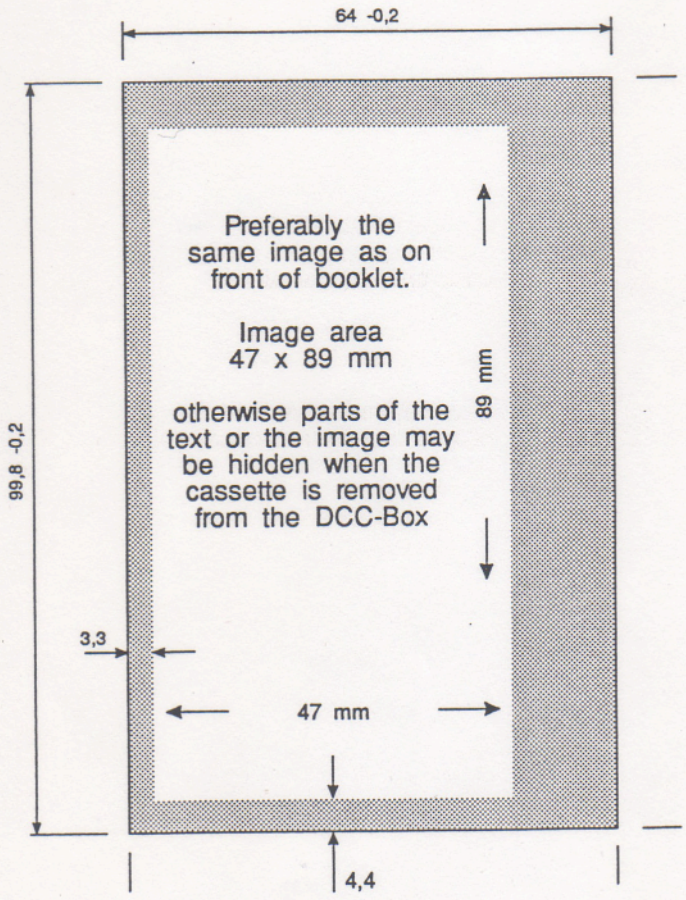


Figure 7

	Colours	Pages	Page number	Position of page no.	Substance
COVER	full	4	Front 1	outside text area	150 - 170g/m^2
			Back 2		
			Inside L 3		
			Inside R 4		
INNER PAGES	full	max. 20	1 thru 20	within or outside text area	100 g/m^2
	one	max. 20	1 thru 20	within or outside text area	70 g/m^2
	one	max. 32	1 thru 32	within or outside text area	50 g/m^2

Figure 8



14 DEAD RACKING CARD

The "Dead racking card" is designed to be used whilst displaying the DCC in shops.

The DCC itself is then replaced by a dummy foam plastic insert and the "Dead racking card".

See **Figure 8.**

15 INLAY CARD FOR TWINPACK

NOT YET RELEASED

The twinpack box (side by side verion) is currently under development. Dimensions as given in (Figure 9) should not yet be used for creating films.

16 FOLDED CARD (not yet released)

The dimensions of the folded card are given in **Figure 10.**

17 DOUBLE FOLDED CARD(not yet released)

The dimensions are given in **Figure 11.**

18 REAR LABEL

Film dimensions for are given in **Figure 12.**

18.1 Information on the rear label

- Artist/Title;
- Trade Mark;
- Catalogue no. (last digit 5 indicates DCC);
- Made in ....;
- Copyright clause, Copyright facsimiles;
- Ⓟ notice;
- German label code.

Note: as the rear label provides not enough space for titles etc. the following sentence is recommended:

For full details see booklet.

18.2 Film requirements

- Film
  Seen from the emulsion side the unscreened matt film must be positive wrong reading.
- Films may not be included in colour separations for paper work.

Outside the printing area each film must contain:
Colour reference (PMS)
catalogue no.
cross marks

- Point size: min. 5 point
  Bold, Light Bold and Light type to be avoided
  This is 5 point HELVETICA.
- Line thickness: min. 0,15 mm
  This is a 0,15 mm line
- Colour
  For the time being the rear label is printed in WHITE on the dark grey cassette surface.

18.3 Standard Grid (film)

A standard grid can be ordered under code number 4922 000 26170 at the address mentioned in par. 19

19 ADDRESS

PolyGram International Music B.V.

International Standardisation

P.O. Box 23 ☎ +31 2154 19726
3740 AA Baarn Telex: 43400 phrc nl
The Netherlands Fax: +31 2154 16400

Figure 9

Figure 10

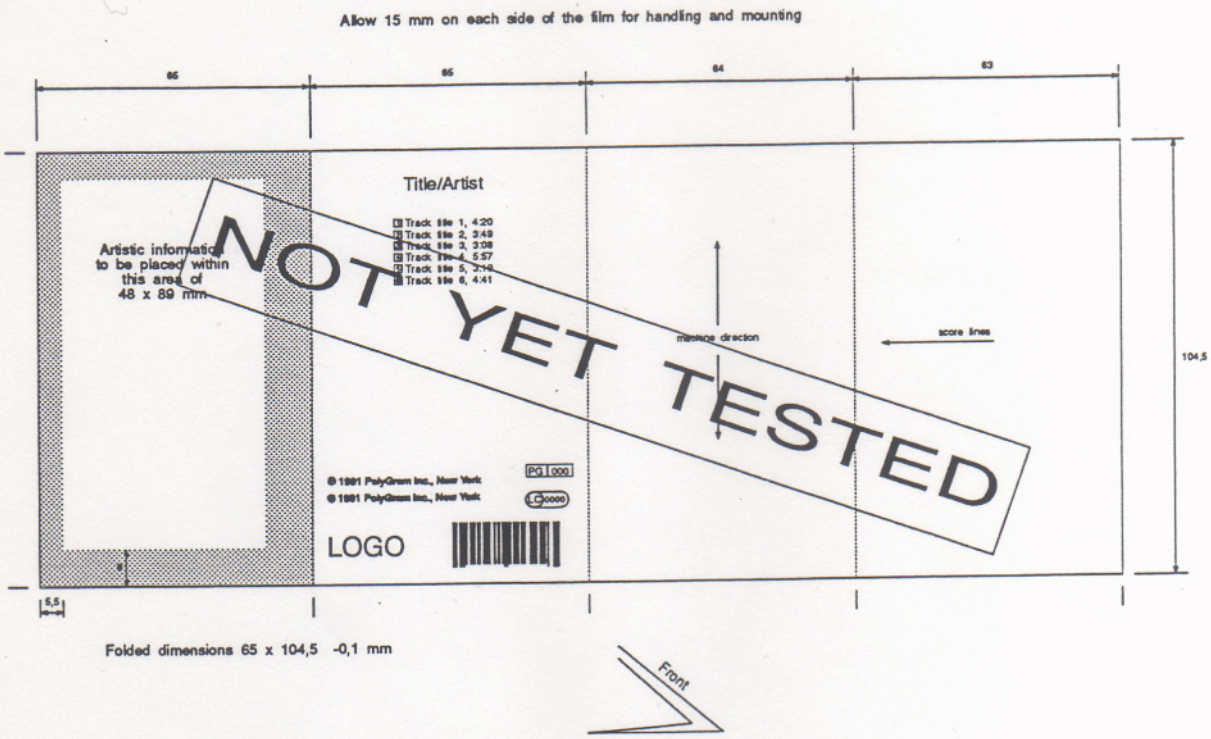


Figure 11

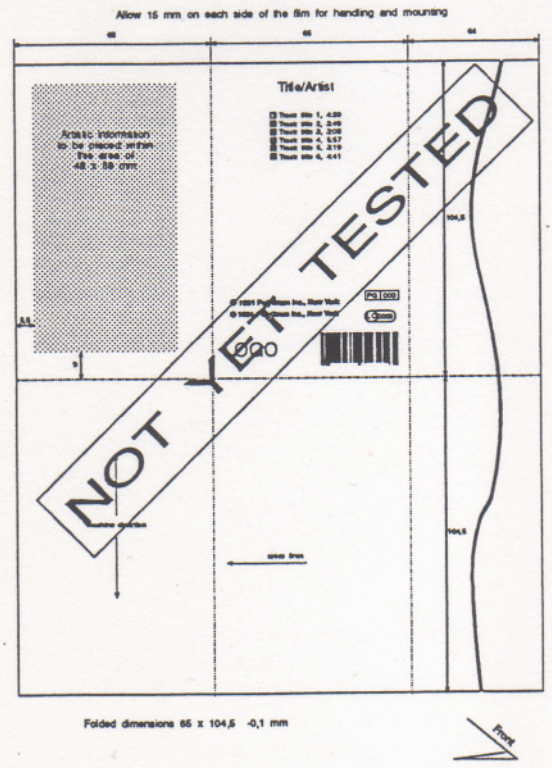
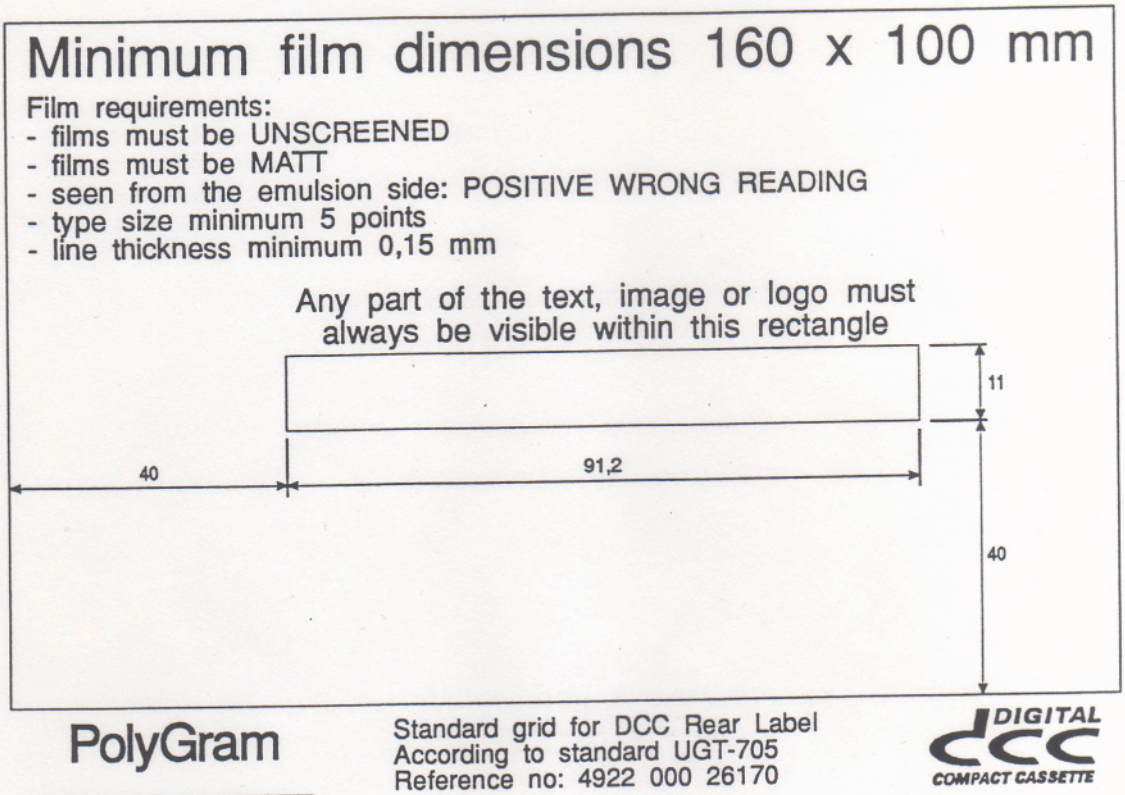


Figure 12



PolyGram

Standard grid for DCC Rear Label
According to standard UGT-705
Reference no: 4922 000 26170

DIGITAL dcc COMPACT CASSETTE

DCC PACKAGING CHECKLIST

Catalogue Number: Title:

Label: Artist:

CASSETTE

DCC Rear Label Film ❒ Proof ❒
DCC Cover Card Film ❒ Proof ❒

BOOKLET

DCC Booklet Front Film ❒ Proof ❒
DCC Booklet Back Film ❒ Proof ❒
DCC Booklet Inner pages Film ❒ Number of Pages _____
Max number of inner pages: full colour 20, one colour 32 (multiples of 4)

INLAY CARD

DCC Inlay Film ❒ Proof ❒
DCC Inlay Reverse Film ❒ Proof ❒
If no specific film is supplied the standard Handling Instructions will be printed

SPECIAL WORKING

Gold Print ❒ Gold Block ❒ Other _____
Silver Print ❒ Silver Block ❒ Other _____

Comments .....

.....

Please check that you receive all films indicated and sign and date below in the space provided. Could you fax this copy back to Company ..... Name ..... Fax no.: .....

Three days will be allocated after despatch of films for you to send this form back to us.

Complete set of films to be shipped to:

	Non-PolyGram Company	PolyGram Classical	PolyGram Popular
Name:	.....	.....	.....
Company:	.....	.....	.....
Street:	.....	.....	.....
Place and postcode:	.....	.....	.....
Country:	.....	.....	.....
Fax:	.....	.....	.....

.....
(Signature of recipient)

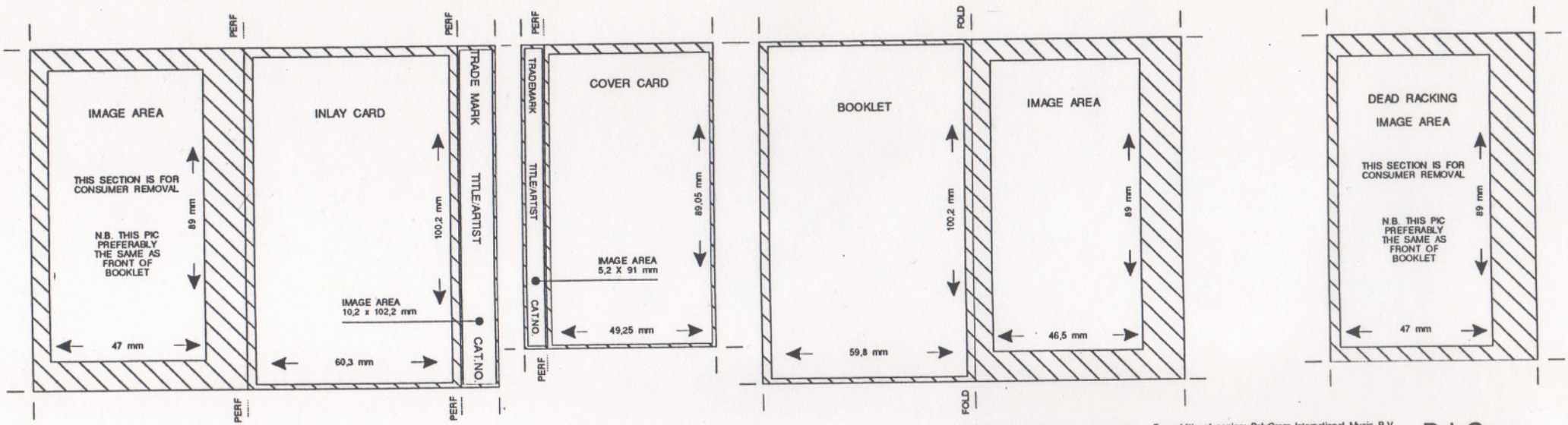
.....
(Date)

Name: ..... Tel.no.: ..... Fax.no.:.....

Comments .....

.....

DIGITAL dcc COMPACT CASSETTE



Standard Grid for DCC (acc. to UGT-705)
Code no. : 4922 000 26160
RIGHT READING

MODIFIED: 1993-05-19

For additional copies: PolyGram International Music B.V.
International Standardisation
P.O.Box 23, 3740 AA BAARN, THE NETHERLANDS
Tel: + 31 2154 19726, Fax: +31 2154 16400

PolyGram

NOT ON SCALE

Attention: Modified version dated 1993-05-19.