



# **DIGITAL PLAYER**

## **DP4100-(xxx)**

### **AIRCRAFT MAINTENANCE MANUAL**

**Issue 3**

**April 2016**

**Upwards serial no. 500**

**DV62500.03 / Article Number 0530.700-071**

Becker Avionics GmbH • Baden-Airpark B108 • 77836 Rheinmünster • Germany

☎ +49 (0) 7229 / 305-0 • Fax +49 (0) 7229 / 305-217

<http://www.becker-avionics.com> • E-mail: [info@becker-avionics.com](mailto:info@becker-avionics.com)

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**INTRODUCTION**

**1. General**

This manual describes the BECKER Digital Player DP4100-(xxx).

It contains all information and test procedures which are required for aircraft installation and maintenance of the Digital Player.

**2. Manufacturing**

The Digital Player is manufactured and supported by :

Becker Avionics GmbH  
Baden Airpark  
77836 Rheinmünster  
Germany

Phone: +49 (0) 7229-305-0  
Fax: +49 (0) 7229-305-217  
e-mail: [info@becker-avionics.de](mailto:info@becker-avionics.de) or [support@becker-avionics.de](mailto:support@becker-avionics.de)

[http:// www.becker-avionics.com](http://www.becker-avionics.com)

**3. Layout of manual**

This manual contains a general description, technical data, operating instructions followed by information for theory of operation, maintenance and repair. An illustrated parts list gives further detailed information.

**4. Revision service**

This manual will be updated as required.  
Service bulletins may be issued separately. Their effect on the manual will, however, be made evident by reissue of the service bulletin list as appropriate.



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**GENERAL INFORMATION**

**1. Application**

The Digital Player DP4100-(xxx) is intended for installation in aircraft. It is a reproducer unit for audio files in conjunction with the public address amplifier or any other external audio amplifier.

**2. General description**

- A. The Digital Player DP4100-(xxx) is the successor of the Tape Player TP3100 in form and fit. The DP4100-(xxx) data storage is accomplished on carriers easily alterable and accessible from the front panel.
- B. The Digital Player is a monoblock unit in accordance with ARINC standard for control units, and secured by four DZUS fasteners.
- C. The Digital Player operates from the 27.5V aircraft power supply system. A 25pin D-Sub male connector is provided for the interface to the power supply system, to the audio system, etc.
- D. The liquid crystal display on the front panel is a 86 x 37 dot matrix display. The display has LED back-light.
- E. The Digital Player is a playback unit for audio files. Several tracks can be played back automatically, like a CD-player. The audio files are stored on a PCMCIA-ATA-flashcard (or Compact Flashcard 2 GB with ATA-Adapter) in MPEG2-layer3 (MP3) format.
- F. The human interface depends on the data-structure of the PCMCIA-ATA- flashcard (or Compact Flashcard 2 GB with ATA-Adapter). The card can be configured as a simple *Audio-Card*; in this case the human interface is like a CD-player. The track to be played back can be selected by *Select*-buttons or *Data*-knob. After pressing the *Play/Pause/Stop*-button, the playback will be started at the current track. After this, the following tracks will be played automatically. Stop will set the current track to 1.
- G. If the card is configured as an *Announcement-Card*, two menus are available. In the 1<sup>st</sup> menu, a mission can be selected, the 2<sup>nd</sup> menu defines a language list. The current announcement will be played in the selected language, after that, the playback will be stopped automatically, and the next announcement is automatically selected. The playback can be stopped by the *Play/Pause/Stop*-button. The volume can be adjusted during playback, if this function is enabled.
- H. The software of the device (firmware) is stored in a built-in Flash-ROM. Two test-variants are implemented in the software: *Power-On-Built-In-Test* (PBIT) and *Continuous-Built-In-Test* (CBIT).
- I. The cardsetup software package (CD-ROM with order number 0546.763-909) is required for the data compilation of music or announcements ATA-flashcards (or Compact Flashcard 2 GB with ATA-Adapter). Only the ATA-flashcards (or Compact Flashcard 2 GB with ATA-Adapter) may be used (order number see page 1-2).

**3. Available versions**

DP4100-(001) DP4100-(011) mono output, control output for external eject indication, (retrofit unit for TP 3100-(1)), incl. Aircraft Maintenance Manual	Article-No.: 0527.343-925 Article-No.: 0596.868-925
DP4100-(002) mono output, control output for external run indication, (retrofit unit for TP 3100-(1)-02), incl. Aircraft Maintenance Manual	Article-No.: 0527.351-925
DP4100-(003) stereo output, volume control with 20 dB max. attenuation, (retrofit unit for TP 3100-(2)), incl. Aircraft Maintenance Manual	Article-No.: 0527.361-925
DP4100-(004) stereo output, volume control with 60 dB max. attenuation, (retrofit unit for TP 3100-(2A)), incl. Aircraft Maintenance Manual	Article-No.: 0527.378-925
DP4100-(005) mono output, control output for external eject indication, (retrofit unit for TP 3100-(1)-03), incl. Aircraft Maintenance Manual	Article-No.: 0543.284-925

**4. Accessories**

The following articles are contained in the scope of delivery:

<i>Name of the item</i>	<i>Article-No.</i>
DP4100 Cardsetup Software (CD-ROM incl. manuals in PDF format)	0546.763-909

The following articles are not contained in the scope of delivery:

<i>Name of the item</i>	<i>Article-No</i>
Cable Jack 25-pin (incl. locking device)	0430.293-254
Demo Flashcard	0546.658-909
Compact Flashcard 2GB with ATA-Adapter	0648.744-956

**Note:** The Compact Flashcard 2 GB with ATA-Adapter can replace the ATA-Flashcards.

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**INSTALLATION**

**1. General**

- A. The installation of the unit depends on the type of aircraft and its equipment. For this reason, only generally applicable information can be provided in this section.
- B. Before installing the unit in an aircraft, a visual inspection should be carried out in order to determine any damage which may have occurred during transport, paying particular attention to the following:
- (1) Dents, scratches, broken fastenings, damage to housing or housing parts.
  - (2) Dirt and scratches on front panel and type label.
  - (3) Dirty, bent or broken pins, cracked bushings, burning on male or female contacts.
  - (4) Pushbuttons that are dirty, mechanically damaged or not freely moving.
  - (5) Jamming rotary switches or loose knobs.
  - (6) Loose seats, missing screws and washers.

**2. Mechanical installation**

The unit should be installed in a suitable place in the aircraft where it is easily accessible by the flight attendant. For applicable installation dimensions of the unit, see figure 2-1.

**3. Aircraft wiring**

**A. General information**

The aircraft wiring of the unit differs depending on the type of aircraft and equipment. For this reason, only generally applicable information can be provided.

**NOTE :** The audio lines should be screened and provided with a common shield for uncertain EMI conditions.

**B. Pin connection of the unit connector**

Plug: P1

Pin No.:

- 1 Supply voltage +27.5V DC
- 2 Supply voltage + 27.5V DC
- 3 Monitor output HI
- 4 Ground
- 5 Illumination ground
- 6 Drive / Stop input
- 7 Connector coding (pin removed)
- 8 RXD, RS 232 receive data, (AF-IN)
- 9 Audio output LO, mono channel or stereo left channel
- 10 Audio output Hi, mono channel or stereo left channel
- 11 Chassis ground (AF-GND)
- 12 Chassis ground
- 13 Audio output HI, stereo right channel for DP4100-(003)/-(004) only,  
Unused for DP4100-(001)/ -(011)/-(002)
- 14 Monitor output LO
- 15 Supply voltage ground
- 16 Supply voltage ground



- 17 External volume control TAP
- 18 External volume control HI
- 19 External volume control GND / RS 232 shield
- 20 TXD, RS 232 transmit data
- 21 Control output / Open collector,  
  
External run indication, opposite definition of pin 25
- 22 Illumination +27.5V DC
- 23 /IN (GND), additional announcement input
- 24 Audio output LO, stereo right channel for DP4100-(003)/-(004) only,  
  
Unused for DP4100-(001)/ -(011)/-(002)
- 25 Control output / Open collector,  
  
External eject indication for DP4100-(001)/ -(011)/-(003)/-(004)  
  
External run indication for DP4100-(002) only

**C. Protection and wiring**

The digital player should be safeguarded by a 350 mA overload protection. For wiring examples refer to Fig. 2-2 or 2-3.

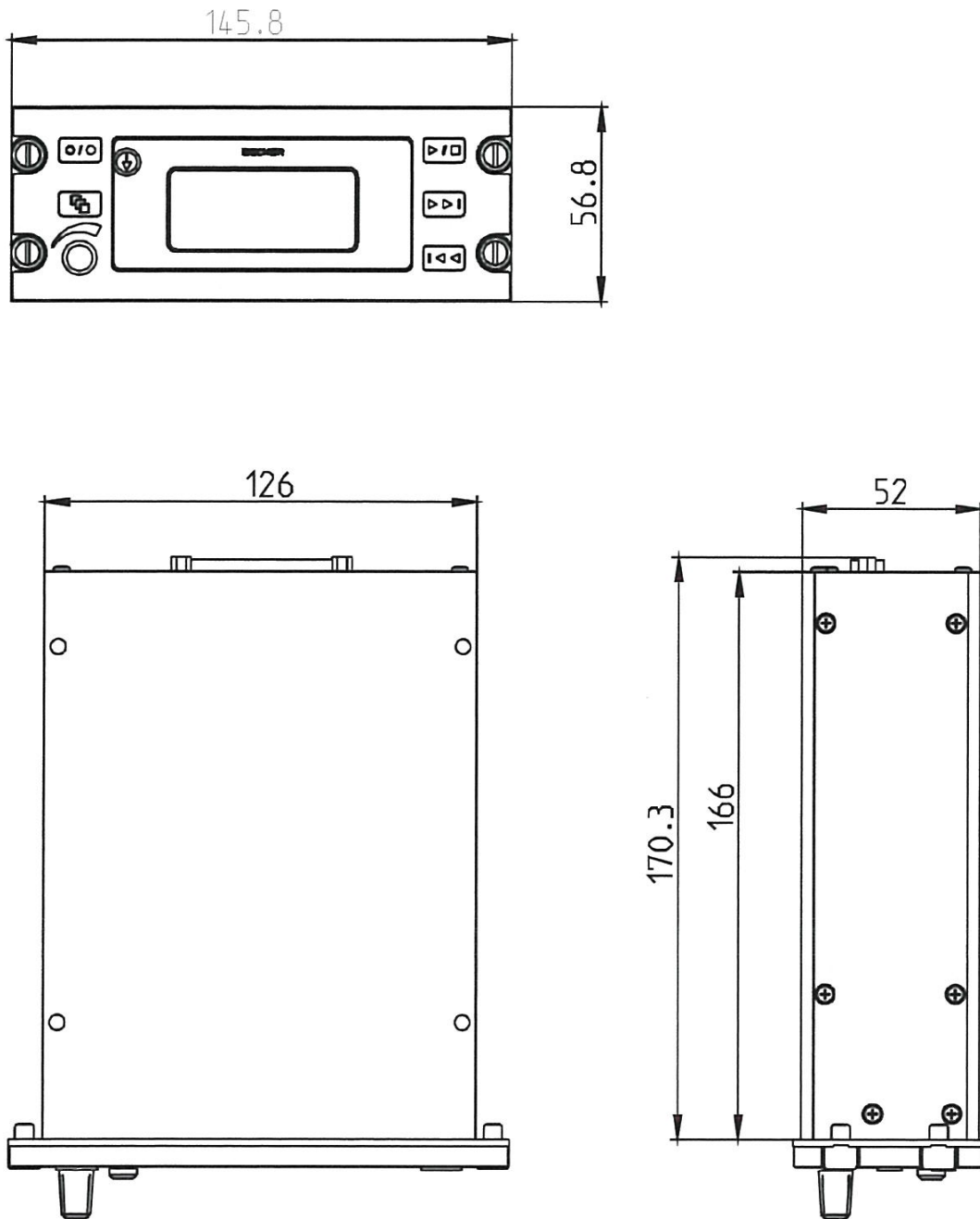


Fig. 2-1 Installation dimensions

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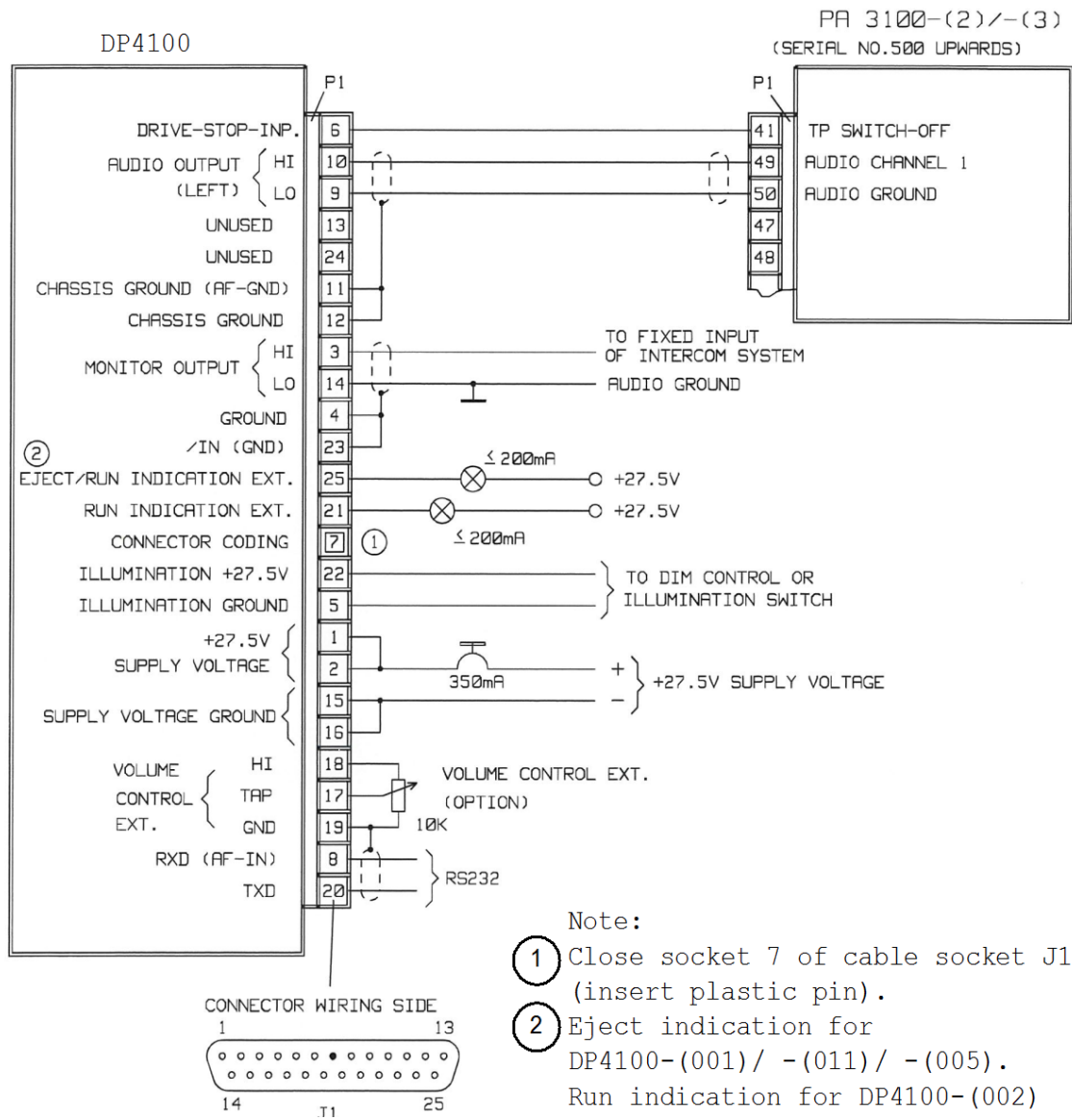
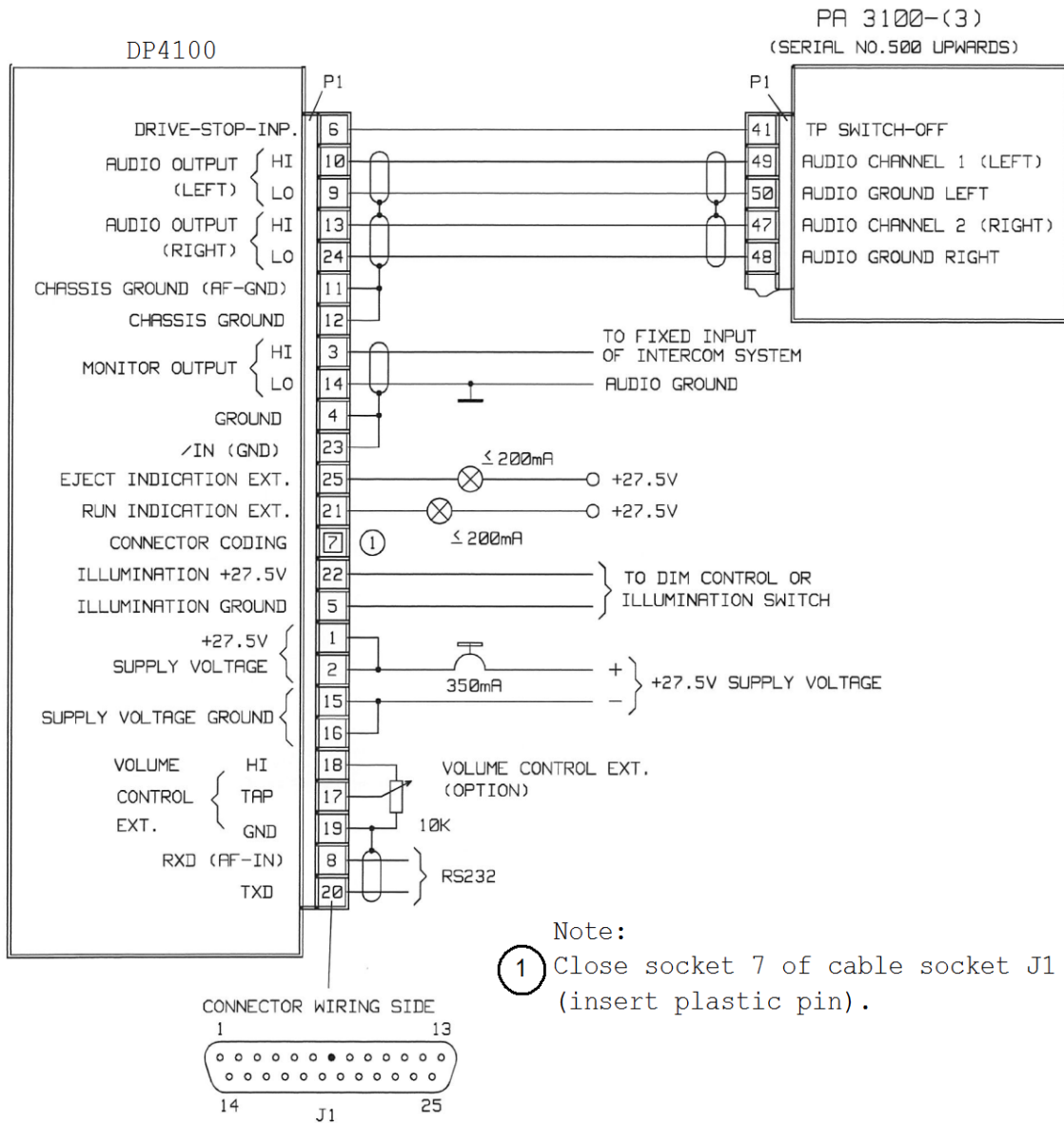


Fig. 2-2 Interwiring diagram for DP4100-(001)/-(011)/ -(002)/ -(005)

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Note:  
① Close socket 7 of cable socket J1 (insert plastic pin).

Fig. 2-3 Interwiring diagram for DP4100-(003) / -(004)

**4. Digital player connection**

For the interconnection of the digital player with the passenger address amplifier it is necessary to investigate which input signals are required :

- a. The audio signal in amplitude and impedance.
- b. The activation signal for switching the amplifier in service.

The audio output level is 0dBm across 600 Ohm symmetrical.

The output pinning compare figure 2-2 or 2-3.

**5. Test after installation**

After installation, the digital player must be checked for proper service in the aircraft by testing all functions of the controls and indicators as described in Section 3 "Operating Instructions". Also see selftest section 3.12.



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OPERATING INSTRUCTIONS

1. Operating controls

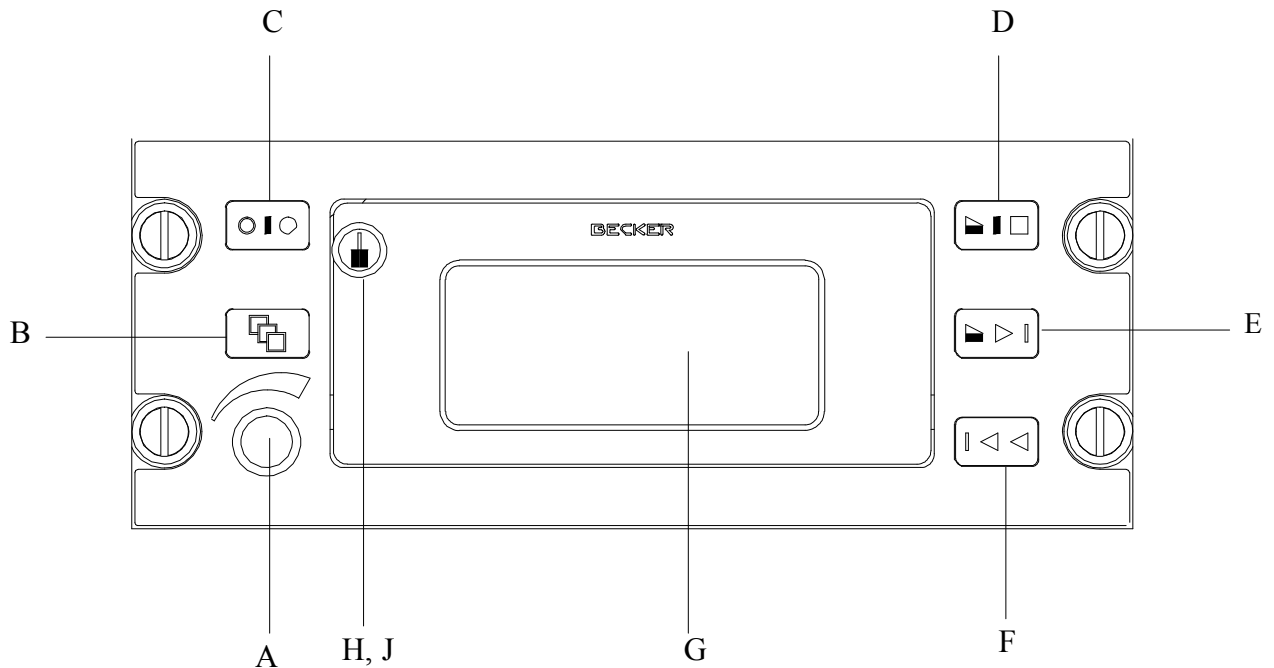


Fig. 3-1 Front panel

2. Description and function of operating controls

Item	Controls	Description	Function
A	Data selector	Rotary switch with push-button switch	Data selection or volume control
B	Menu button	Push-button	Menu selection
C	On/Off button	Push-button	System on/off switch
D	Play/Pause/Stop button	Push-button	Start, Pause and Stop of audio playback
E	Select right button	Push-button	Forward selection
F	Select left button	Push-button	Backward selection
G	Display	Dot matrix LC-Display	Displaying system status and selection possibilities
H	Release button	Push-button	Unlock display flap
J	Slot	PCMCIA slot	Memory card adaption

### 3. Operating instructions

#### 3.a Introduction

The Becker digital player is an audio playback system for passenger information, safety instructions or music to be used in aircraft cabin environments.

It can act as a standard CD-player (music entertainment) or an announcement system with a display based user guidance.

The audio tracks (music or announcements) are stored by using a special file and folder structure on standard PCMCIA flash memory cards (or Compact Flashcard 2 GB with ATA-Adapter) which are protected against vibration or mechanical shocks. The MPEG2 Layer3 (MP3) file format is used to ensure easy handling. By this, standard tools can be used for recording of new announcements or music.

The file and folder structure on the used memory card decides the kind of operation of the digital player. There are 2 types of cards supported:

- "Music-Card"                      The digital player acts like a CD-player.

- "Announcement-Card"            The digital player acts as an announcement system.

The "Music-Card" can be used to playback up to 999 music tracks from one memory card. The number of tracks which can be stored on a card depends to the available memory size and the used bitrate.

With an "Announcement-Card", the digital player supports up to 99 missions stored on a card.

The digital player supports ATA-Flash-Cards with a memory space up to 2GB. The standard for the card is the PCMCIA PC-Card. With an adapter available from third parties, Compact Flash Cards can also be used.

The ATA-Norm ensures that the memory cards can be read and written with a standard personal computer. Please that file naming must be in accordance to the DOS constraints which means up to 8 chars for the name and up to 3 chars for the file extension.

#### **Note**

For preparation of cards to be used inside the digital player system, a special software tool running on standard personal computers is available. This tool is delivered on a CD-ROM which also contains the system and software manuals.

#### **CAUTION**

The digital player operates with ATA-flashcards (or Compact Flashcard 2 GB with ATA-Adapter) only. SRAM cards or other memory card standards will not be accepted.

For retrofit reasons, the digital player is pin compatible with the TP3100 analog audio tape player provided by BECKER in the past.

The digital player supports several interfaces for flexible system integration in a wide range of fixed and rotary wing aircraft.

### 3.b Power-On

The digital player can be switched on by pressing the On/Off Button (C) for a short time. By doing this, the initialization process of the system is started. In parallel, the Becker logo is viewable on the display. In the background, a self test routine is processed which checks the internal system functionalities and the presence of a correct memory card. If the memory card is identified, the card information is shown on the display for some seconds and afterwards the system switches to the "STOP" mode and is available for operation.

Depending on the file structure on the memory card, the digital player operates in two different operating modes. Either the file structure is in accordance with a "Music-Card" and the digital player acts like a CD-player or it is in accordance with an "Announcement-Card", and the functionalities are prepared for an announcement system.

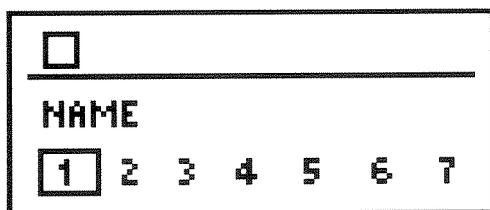
### 3.c "Music-card" operations

Dependent on card-configuration, several operating modes are possible. The actual operating mode will be displayed on the LCD by a symbol.

#### 3.1 "STOP" mode

After the start-up procedure and reading of the card data, the digital player switches automatically into the "STOP" mode. This is the normal start or fall-back mode of the system.

This mode is displayed as follows:

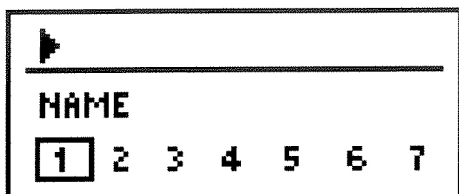



Upper line	<input type="checkbox"/>	= STOP indication
Inner line	NAME	= Title of the active music track
Bottom line		= List of available track identifiers

### 3.2 "PLAYBACK" mode

Pressing the PLAY/PAUSE/STOP Button (D) while in "STOP" mode, will switch the system into "PLAYBACK" mode. The playback of the current music track starts immediately.

This mode is displayed as follows:



- Upper line  = PLAYBACK indication
- Inner line NAME = Title of the active music track
- Bottom line = List of available track identifiers

After finishing the playback of the current music track, the next title of the available list will be played until the last title is played or the operating mode is changed by the user.

Pressing the SELECT RIGHT Button (E) skips the current tile and switches to the next one. The playback of the new title starts.

Pressing the SELECT LEFT Button (F) restarts the current title. A double press skips to the previous music track, if available. In the bottom line of the display, the current title is marked by a frame.

The volume of the audio signal can be adjusted during playback by turning the rotary knob (A).

**NOTE**

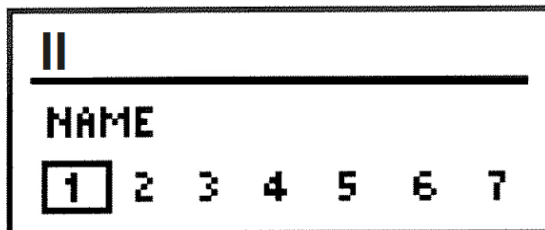
The volume adjust functionality depends on the type of digital player you are using. By configuration, the volume can be adjusted via the front panel of the unit or by an external potentiometer. In addition, the range of adjustment can be narrowed.

Pressing the PLAY/PAUSE/STOP Button (D) for a time longer than 1 second, stops the playback of the music and the digital player goes back into the "STOP" mode.

**3.3 "PAUSE" mode**

Pressing the PLAY/PAUSE/STOP Button (D) for a time shorter than 1 second while the digital player is in "PLAYBACK" mode, the playback of the current title will be paused.

This mode is displayed as follows:



Upper line 11                   =     PAUSE indication  
 Inner line     NAME         =     Title of the active music track  
 Bottom line                   =     List of available track identifiers

By pressing the PLAY/PAUSE/STOP Button (D) once more, the digital player continues playing the current track.

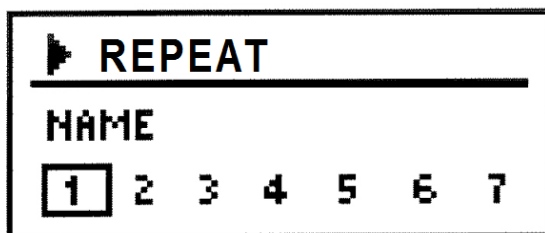
**NOTE**

The PAUSE mode can be activated by a discrete input on the system connector. As long as this input is activated, the playback will be paused. The display will also identify this as described before.

**3.4 "REPEAT" mode**

The digital player also provides continuous playback functionality. Simultaneously pressing the buttons SELECT RIGHT (E) and SELECT LEFT (F) while the system is in "STOP" mode, activates this operating mode.

This mode is displayed as follows:



Upper line     Repeat =     PLAYBACK indication  
 Inner line     NAME     =     Title of the active music track  
 Bottom line                   =     List of available track identifiers

The continuous playback will start immediately with the current music track. After playing the last available title, the playback will be continued with the first title.

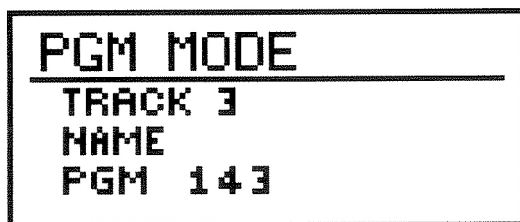
Pressing the PLAY/PAUSE/STOP Button (D) for a time shorter than 1 second will exit the "REPEAT" mode and switch the system into the "STOP" mode.

### 3.5 Playlist preparation

To prepare a user defined playlist out of the available music tracks, the digital player provides a "PROGRAM" mode.

Pressing the MENU Button (B) while the system is in "STOP" mode, activates this operating mode.

The "PROGRAM" mode is displayed as follows:



Upper line PGM MODE = PROGRAM mode indication

Inner lines = Track number and title

Bottom line = just selected items for playlist

Pressing the SELECT RIGHT/LEFT Button (E,F) or turning the DATA SELECTOR (A) scrolls through the available audio tracks (titles). The selection of a title for use in the playlist is achieved by pressing the DATA SELECTOR push button (A). If necessary, the same title can be used in the playlist several times.

After completion of the playlist, the playback can be started directly by pressing the START/PAUSE/STOP Button (D).

#### Playlist playback

The playback of a playlist can be operated in the same way as described in the standard "PLAYBACK" mode. The availability of a playlist is identified by "Pgm Play" in the upper line of the display behind the play/pause/stop identification.

#### Playlist Deletion

Pressing the MENU Button (B) while in the digital player is in "STOP" mode with "Pgm Play" identification, will delete the prepared playlist. After a short message on the display, the system will switch back to the standard "STOP" mode (see page 3-7 ).

### 3.6 Announcement-Card" operations

#### "STOP" mode

After start-up procedure and reading of the card data, the digital player switches automatically into the "STOP" mode. This is the normal start or fall-back mode of the system.

This mode is displayed as follows:



- |             |       |  |
|-------------|-------|--|
| Upper line  | ○     | = STOP indication                        |
| Inner lines | MIS.: | = Identifier of the selected mission     |
|             | ANN.: | = Identifier of the current announcement |
| Bottom line |       | = List of available languages            |

The displayed identifiers for mission and announcement depend on the configuration of the memory card. They are either the filenames or a term which is stored in dedicated text files. Please read the CardSetup Software manual for details.

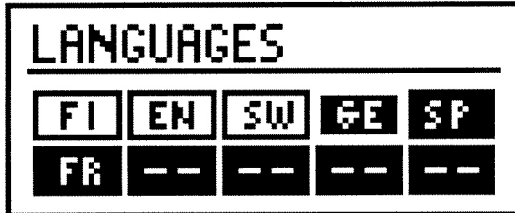
The current announcement can be changed by using the SELECT RIGHT (E) / SELECT LEFT (F) buttons or the DATA SELECTOR (A) rotary switch.

Pressing the MENU Button (B), gives the operator the option to select languages for playback or changing the current mission.

### 3.7 Language selection

By pressing the MENU Button (B) the first time, the system will switch into the "SELECT LANGUAGE" mode.

This mode is displayed as follows:



Upper line      LANGUAGES = Language selection indication

Other lines                      = List of available languages

Up to 10 languages can be defined for a mission. They will be displayed in two lines by their identifiers in small boxes. Unused boxes (less than 10 languages used) are marked with two dashes. Languages which are activated for play-back are displayed with a frame; deactivated languages are displayed inverse. The last edited language item has a blinking frame.

Using the SELECT RIGHT/LEFT Buttons (E,F) or the DATA SELECTOR (A) scrolls through the list of available language items. The status (activated or deactivated) of the last marked item can be changed by pressing the ENTER Knob (A).

#### NOTE

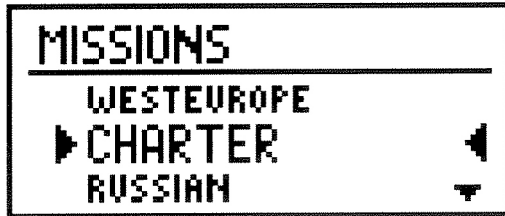
The settings for activated or deactivated languages will not be stored permanently. This means, that after restart of the digital player, all available languages for the missions are activated.



### 3.8 Mission selection

By pressing the MENU Button (B) the second time, the system will switch into the "SELECT MISSION" mode.

This mode is displayed as follows:



Upper line MISSIONS = Mission selection indication

Other lines = List of available missions

Using the SELECT RIGHT/LEFT Buttons (E,F) or the DATA SELECTOR (A) scrolls through the list of available missions. The mission in the middle of the 3 lines (identifier with bigger letters), framed by triangles, represents the currently selected mission.

A triangle at the bottom or top line of the listed items shows that additional missions are available in the list.

#### NOTE

If prepared on the used memory card, a mission called "MUSIC" can be selected. By selection of this mission, the digital player operates similarly to a CD-player. In this "mission", all audio tracks will be played in succession.

By pressing the MENU Button (B) once again, the system will switch back into the "STOP" mode.

### 3.9 "PLAYBACK" mode

Pressing the PLAY/PAUSE/STOP Button (D) while in "STOP" mode, will switch the system into "PLAYBACK" mode. The playback of the current announcement starts immediately.

This mode is displayed as follows:



Upper line		=	PLAYBACK indication
Inner lines	MIS.:	=	Identifier of the selected mission
	ANN.:	=	Identifier of the current announcement
Bottom line		=	List of available languages

The selected announcement is played with all of the selected languages. Already finished languages are marked inversely and the last played language is shown by a blinking frame.

The volume of the audio signal can be adjusted during playback by turning the DATA SELECTOR (A).

#### NOTE

The volume adjust functionality depends to the type of digital player you are using. By configuration, the volume can be adjusted via the front panel of the unit or by an external potentiometer. In addition, the range of adjustment can be narrowed.

Pressing the PLAY/PAUSE/STOP Button (D) for a time longer than 1 second, stops the playback of the announcement and the digital player goes back into the "STOP" mode.

### 3.10 "PAUSE" mode

Pressing the PLAY/PAUSE/STOP Button (D) for a time shorter than 1 second while the digital player is in "PLAYBACK" mode, the playback of the current announcement will be paused.

This mode is displayed as follows:



Upper line		= PAUSE indication
Inner lines	MIS.: ANN.:	= Identifier of the selected mission = Identifier of the current announcement
Bottom line	FI EN SW GE SP	= List of available languages

By pressing the PLAY/PAUSE/STOP Button (D) once more, the digital player continues playing the current track.

#### NOTE

The "PAUSE" mode can be activated by a discrete input on the system connector. As long as this input is activated, the playback will be paused. The display will also identify this as described before.

### 3.11 System properties

The digital player provides the operator with the option to adjust several parameters which affect the behavior of the system. The adjustments can be done in a special "PROPERTIES" mode that will be activated by pressing the MENU Button (B) for a time longer than 2 seconds.

This mode is displayed as follows:



Upper line	PROPERTIES	= PLAYBACK indication
Other lines	VOL BASS TREB	= List of available parameters

Several parameters can be selected by pressing the SELECT RIGHT/LEFT Buttons (E,F) or the ENTER Knob (A), whereby the selected parameter is marked by a triangle. The display scrolls down and up as necessary to show all items in the list.

Turning the DATA SELECTOR (A) changes the value of the selected item inside its given range.

The following parameters are available:

No.	Identifier	Range	Description
1	VOL	0...44	Minimum volume of audio signal
2	BASS	0...18	Bass adjustment of the audio signal
3	TREBLE	0...18	Treble adjustment of the audio signal
4	LIGHT	0...63	Dimming of the display backlight
5	KEYS	0...63	Dimming of the panel backlight
6	DELAY	200...2500	Delay between audio tracks (in steps of 50msec)
7	AUDIO	Mono/Stereo	Kind of audio output signal
8	SORT	On/Off	Alphabetical sort function for music tracks
9	AUTOPLAY	On/Off	Automatic start of playback after system switch on.

#### **Property "Volume"**

The volume of the audio output can be limited to a minimum value by setting this property. A value higher than 0 ensures, that the audio playback has a minimum output level to prevent, for example, loss of played back information by faulty operation by the cabin crew.

#### **Property "Bass"**

The "Bass" parameter gives the possibility to increase the playback volume of lower frequencies in the audio signal.

There are 19 steps available. The value "0" means that the lower frequencies will be played back as they are recorded within the audio tracks, the value "18" means that audibility will be emphasized.

#### **Property "Treble"**

The "Treble" parameter gives the possibility to increase the playback volume of higher frequencies in the audio signal.

There are 19 steps available. The value "0" means that the higher frequencies will be played back as they are recorded within the audio tracks, the value "18" means that audibility will be emphasized.

### **Property "Light"**

The brightness of the digital player front panel display (LCD) can be adjusted in 64 steps.

The value "0" means that the brightness will be at the lowest level, the value "63" means that it will be at maximum.

### **Property "Keys"**

The brightness of the digital player front panel illumination (backlight) can be adjusted in 64 steps.

The value "0" means that the brightness will be at the lowest level, the value "63" means that it will be at maximum.

### **Property "Delay"**

The digital player has the option to insert a delay between the playback of audio tracks (music or announcements). This delay can be adjusted in a range between 200 and 2500msec in steps of 50msec.

### **Property "Audio"**

Audio output of the digital player can be used either in Stereo or in Mono. This can be selected by using the "Audio" property.

### **Property "Sort"**

The music titles which are available on a prepared memory card can be sorted in 2 ways for playback with the digital player. Either they are listed and played in the order they were stored in the memory card (sort = off) or in an alphanumeric order (sort = on). The sort option is useful for music cards with many titles.

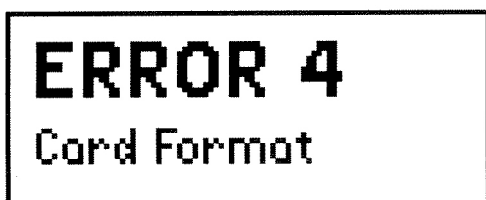
### **Property "Autoplay"**

To facilitate the operation of the digital player, an automatic start of playback after system switch on can be activated. If activated, the playback will start automatically with the first music title (music card) or the first announcement (announcement card)

### 3.12 System selftest

For safety reasons, the digital player provides a built in self test functionality. This test is running continuously in the background when the system is switched on.

In the case that an error is detected, this will be shown by an error message on the display.



Upper line = Error identifier

Bottom line = Short description of the error

If there is more than one error detected at the same time, this will be displayed by a triangle behind the error identifier. Pressing the SELECT RIGHT/LEFT Buttons (E,F) scrolls through the list of detected failures.

The following error identifiers are possible:

Identifier	Description	Remark
Error 1	Card Format	File structure on the used memory card is faulty
Error 2	No Card	There is no card inside the slot
Error 3	Audio System	The audio processing functionality is faulty
Error 4	RAM	Failure inside operating memory system
Error 5	ROM	Failure inside program memory



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**MAINTENANCE PRACTICES**

1. **Maintenance**

If a malfunction occurs, test the function of the Digital Player using another ATA-flashcard (or Compact Flashcard 2 GB with ATA-Adapter). If the result of this test is not positive, exchange the complete unit.



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