



IC 3100 - ()

IC Amplifier

Installation and Operation

Manual DV 29004.03

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IC 3100 - ()

GENERAL INFORMATION

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1.1Introduction

The following Handbooks describe the IC amplifier IC 3100 - () of the Audio Selector and Intercom System ASI 3100. Several models of this amplifier are available.

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1.2Application

The IC amplifier IC 3100 - () is designed for installation in aircraft with a high level of cabin noise. Depending on the model, it offers intercommunication between the passengers, between pilot and copilot, and between passengers and cockpit crew.

1.3General description

The IC amplifier is a monobloc unit, intended for installation in the avionics area of aircraft. The 50-pin unit connector is located at the end of the unit.

The IC amplifier comprises a choice of the following modules, depending on the model :

- max. 3 mike amplifier modules
- max. 2 HOT MIKE modules
- max. 2 speaker amplifier modules (used for headphone amplifiers)

These modules are positioned on the interwiring board which also holds the voltage regulator.

The IC amplifier offers the following modes :

1. Optionally HOT MIKE operation or IC operation between passengers (PA branch).
2. Optionally HOT MIKE operation or IC operation between pilot and copilot, irrespective of the intercom unit used (pilot/copilot branch).
3. Optionally HOT MIKE operation or IC operation between passengers and cockpit crew. An external switch serves to connect and disconnect PA branch and pilot/copilot branch.

The IC amplifier is designed for the connection of 2 headsets for the pilot, and for max. 6 headsets for the passengers. Depending on the model, the unit features mike inputs for standard carbon mikes or for dynamic mikes.

1.4 Table of models

The following table itemizes the various versions of the IC amplifier. Externally, there is no evident difference, i.e. the dimensions are the same for all models.

| Model designation | Distinguishing features | Part No. |
|-------------------|---|--------------|
| IC 3100 - (1) | PA branch Pilot/copilot branch Standard mike amplifiers | 0432.369-921 |
| IC 3100 - (2) | PA branch Standard mike amplifiers | 0432.377-921 |
| IC 3100 - (3) | PA branch Pilot/copilot branch Dynamic mike amplifiers | 0432.385-921 |
| IC 3100 - (4) | PA branch Dynamic mike amplifiers | 0387.851-921 |
| IC 3100 - (5) | PA branch Pilot/copilot branch (without mike amplifiers) Connection of max. 2 standard mikes per branch | 0432.393-921 |
| IC 3100 - (6) | PA branch (without mike amplifiers) Connection of max. 2 standard mikes | 0432.407-921 |

| Model designation | Distinguishing features | Part No. |
|-------------------|--|--------------|
| IC 3100 - (7) | Pilot/copilot branch Dynamic mike amplifiers | 0775.663-921 |
| IC 3100 - (8) | Pilot/copilot branch Standard mike amplifiers | 0775.630-921 |

1.5 Technical data

1.5.1 General data

| | |
|-----------------------------|---|
| Supply voltage | 27.5 V DC upper limit 30.3 V lower limit 24.8 V |
| Current consumption | ≤ 2 A |
| Altitude capability | 50000 ft. |
| Operating temperature range | - 20° ... + 55° C (short-time + 70° C) |
| Vibration resistance | RTCA DO-160 Cat. M + N |
| Ambient conditions | RTCA DO-160 Env. Ca. D1/A/MN/XXXXXXABABA |

Dimensions

| | |
|--------------|-------------------------------------|
| - Case | 245 x 45 x 128.5 mm (L x W x H) |
| - Case depth | approx. 275 mm incl. unit connector |
| Weight | max. 0.7 kg |

1.5.2 Mike inputs

| | |
|-------------------------------|-------------------------------------|
| Standard input, passengers | 200 250 mV into 150 Ω |
| Standard input, pilot/copilot | 200 250 mV into 150 Ω |
| Dynamic input, passengers | 500 μV 20 mV into 5 Ω/200 Ω |
| Dynamic input, pilot/copilot | 500 μV 20 mV into 5 Ω/200 Ω |

1.5.3 Audio outputs / inputs

| | |
|---|---|
| Audio outputs, passengers | max. 300 mW per output into 5 Ω/300 Ω (adjustable with R 2011) |
| Audio outputs, pilot/copilot | max. 300 mW per output into 5 Ω/300 Ω (adjustable with R 2065) |
| Audio input 1 in the pilot/copilot branch | min. 2,25 V into 560 Ω (at rated power) (adjustable with R 2068) |

| | |
|---|---|
| Audio input 2 in the pilot/copilot branch (option volume control line pi/co) | min. 2,25 V into 560 Ω (at rated power) (adjustable with R 2072) |
| IC ring line | 0,65 . . . 0,72 V into 200 Ω (adjustable with R 5003) |

1.5.4 Mike amplifier module for standard mikes

| | |
|--------------------------------------|------------------------------------|
| Input impedance | 150 Ω |
| Input voltage | \leq 250 mV |
| Output voltage | 250 mV into 150 Ω |
| Frequency response | 350 Hz 6 kHz (\pm 3 dB) |
| Distortion factor | \geq 10% |
| Signal-noise ratio $\frac{S + N}{N}$ | \leq 50 dB |

1.5.5 Mike amplifier module for dynamic mikes

| | |
|--------------------------------------|--|
| Input impedance | 5 200 Ω |
| Input voltage | 500 μ V 20 mV |
| Output voltage | 0,65 . . . 0,72 V into 150 Ω (stabilized) |
| Frequency response | 350 Hz 6 kHz (\pm 3 dB) |
| Distortion factor | \leq 10% at 0,7 V into 150 Ω |
| Signal-noise ratio $\frac{S + N}{N}$ | \geq 50 dB |

1.5.6 HOT MIKE module

| | |
|----------------------------|--|
| Threshold switch | |
| - Response threshold | 0,55 . . . 0,80 mV $EMK / R_i = 200 \Omega$, f = 200 Hz (adjustable with R 5023) |
| - Response time | \leq 30 ms |
| - Holding time | 0.5 . . . 3.0 s (adjustable with R 5035) |
| IC ring line amplifier | |
| - Audio output voltage | 0,65 . . . 0,72 V into 200 Ω (adjustable with R 5003) |
| - Frequency response | 350 Hz 6 kHz (\pm 3 dB) |

IC 3100 - ()

INSTALLATION

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2.1 General

Where and how the IC amplifier is installed, depends on the desired model, and also on the type of aircraft and aircraft equipment. Therefore, this section can give only general information.

2.2 Check prior installation

Prior to installing the IC amplifier in an aircraft, carry out a visual check for damage caused during transit, paying special attention to the following deficiencies :

1. Dirt deposits, dents, scratches, corrosion and broken fasteners.
2. Dirt deposits and scratches on or in nameplate and markings.
3. Dirt deposits, deformed or fractured pins, cracking in unit connector insert.

2.3 Mechanical installation

The IC amplifier has to be installed at a suitable place in the aircraft. As a rule, the avionics area is an appropriate place. Fig. 2-1 shows the IC amplifier dimensions needed for installation.

2.4 Aircraft wiring

2.4.1 General

The aircraft wiring for the IC amplifier varies according to model, type of aircraft and equipment. Again, therefore, only general particulars can be stated.

NOTE

The signal lines should be screened and, if necessary, twisted accordingly.

2.4.2 Fusing and wiring

The IC amplifier should be protected by a 3 A fuse. Fig. 2-2 shows a wiring proposal for the IC amplifier.

2.4.3 Pin connections of unit connector

Unit connector : J 1001

| <u>Connection :</u> | <u>Pin :</u> | <u>Connection :</u> | <u>Pin :</u> |
|-----------------------------|--------------|--------------------------------|--------------|
| IC ring line AS 3100 - () | 1 | Volume control line (Pass.) | 3 |
| IC control line (PA branch) | 2 | IC control line (Pi/Co-branch) | 4 |

| <u>Connection :</u> | <u>Pin :</u> | <u>Connection :</u> | <u>Pin :</u> |
|---------------------------------|--------------|--|--------------|
| Audio input 1 (Cockpit avionic) | 5 | Mike input 1 (L0), Pass. | 28 |
| Audio input 2 (Cockpit avionic) | 6+ | Mike input 2 (L0), Pass. | 29 |
| Supply voltage ground | 7 | Mike input 3 (L0), Pass. | 30 |
| IC switch-off (+ 11 V) | 8 | Mike input 4 (L0), Pass. | 31 |
| Supply voltage ground | 9 | Mike input 5 (L0), Pass. | 32 |
| Mike input 1 (HI), Pi/Co | 10 | Mike input 6 (L0), Pass. | 33 |
| Mike input 2 (HI), Pi/Co | 11 | Headphone 1, Pass. | 34 |
| Mike input 1 (HI), Pass. | 12 | Headphone 2, Pass. | 35 |
| Mike input 2 (HI), Pass. | 13 | Headphone 3, Pass. | 36 |
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| Headphone ground | 21 | Mike ground | 44 |
| Headphone ground | 22 | Mike ground | 45 |
| Headphone ground | 23 | Mike ground | 46 |
| Headphone ground | 24 | Mike output | 47 |
| Headphone ground | 25 | Supply voltage + 27.5 V | 48 |
| Mike input 1 (L0), Pi/Co | 26 | Supply voltage + 27.5 V | 49 |
| Mike input 2 (L0), Pi/Co | 27 | Supply voltage + 27.5 V | 50 |

+ NOTES

Option : Volume control line for Pi/Co branch (see Section 2.4.4)

2.4.4 External volume control of Pi/Co branch (optional)

When remote Pi/Co volume control is required, the following changes must be made to the system :

1. Unsolder R 2071 and replace by a 10 Ω resistor
2. Unsolder R 2073 and replace by a wire jumper.
3. Unsolder R 2072 and R 2074 and discard.
4. Connect Pi/Co volume control lines to pin 6 of unit connector (see wiring suggestion Fig 2.2).

2.4.5 Adapting IC ring line

The IC ring line of the IC amplifier connects the corresponding intercom units (e.g. Audio Selector and Intercom Unit AS 3100) for max. three units with an input impedance of 600 Ω . The IC audio line level is set in the factory to 0.6 0.7 V into 200 Ω corresponding to the maximum number of three units. When two units are connected, the IC ring line must be terminated with a load resistor of 600 Ω (300 Ω when only one unit is connected). See also Fig. 2-4.

2.5 Checking after installation

2.5.1 General

Having installed the IC amplifier, carry out a function check in the aircraft.

NOTES

- Set the volume of the PA branch and the Pi/Co branch by means of variable resistors R 2011 and R 2065 (accessible from without, see Fig. 2-3) as required for function-testing.
- Hot mike sense and hold can be adjusted by means of variable resistors R 5023 and R 5035 respectively (accessible from without, see Fig. 2-3) as required.
- AF Aux 1 and 2 input sensitivity can be set by means of variable resistors R 2068 and R 2072 as required (accessible from without, see Fig. 2-3).

All other adjustments within the IC amplifier are made in the factory.

2.5.2 Function checks

2.5.2.1 IC operation in the PA branch

1. Set PA switch to position IC and press PTT button.
2. Address all the passenger mikes one by one. The information delivered to then must be heard on all the passenger earphones.

2.5.2.2 HOT MIKE operation in the PA branch

1. Set PA switch to position HOT MIKE.
2. Address all the passenger mikes one by one. The information delivered to then must be heard on all the passenger earphones. In the case of lengthy breaks in communication, the connection must be cut off automatically so that no parasitic noise will be transmitted.

2.5.2.3 Cutting off the intercommunication in the PA branch

1. Set PA switch to position OFF.
2. Intercommunication must be impossible in the PA branch.

2.5.2.4 IC operation in the pilot/copilot branch

1. Set Pi/Co switch to position IC and press PTT button.
2. Address pilot and copilot mikes in turn. The information delivered to then must be heard on both cockpit earphones.

2.5.2.5 HOT MIKE operation in the pilot/copilot branch

1. Set Pi/Co switch to position HOT MIKE.
2. Address pilot and copilot mikes in turn. The information delivered to then must be heard on both cockpit earphones. In the case of lengthy breaks in communication, the connection must be cut off automatically so that no parasitic noise will be transmitted.

2.5.2.6 Cutting off the intercommunication in the pilot/copilot branch

1. Set Pi/Co switch to position OFF.
2. Intercommunication must be impossible in the pilot/copilot branch.

2.5.2.7 IC operation between PA branch and pilot/copilot branch

1. Close PA-Pi/Co switch.
2. Set PA switch and Pi/Co switch to position IC and press PTT button each time.
3. Check intercommunication between cockpit and cabin.

2.5.2.8 HOT MIKE operation between PA branch and pilot/copilot branch

1. Set PA switch and Pi/Co switch to position HOT MIKE.
2. Check intercommunication between cockpit and cabin. In the case of lengthy breaks in communication, the connection must be cut off automatically so that not parasitic noise will be transmitted to the cockpit and also so that the cockpit avionics will not be heard in the cabin.

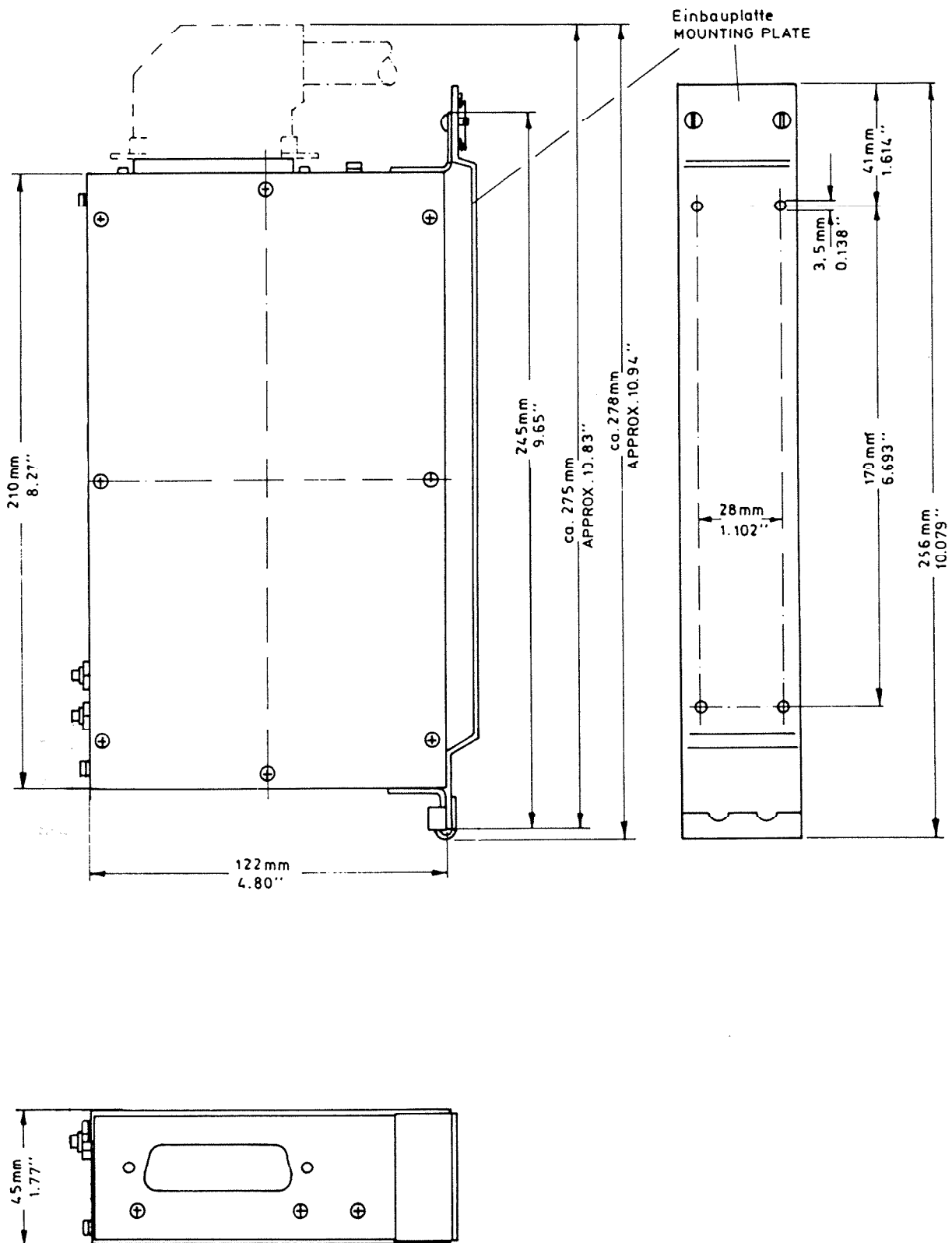


Fig. 2-1 Installation dimensions for IC amplifier IC 3100 - ()

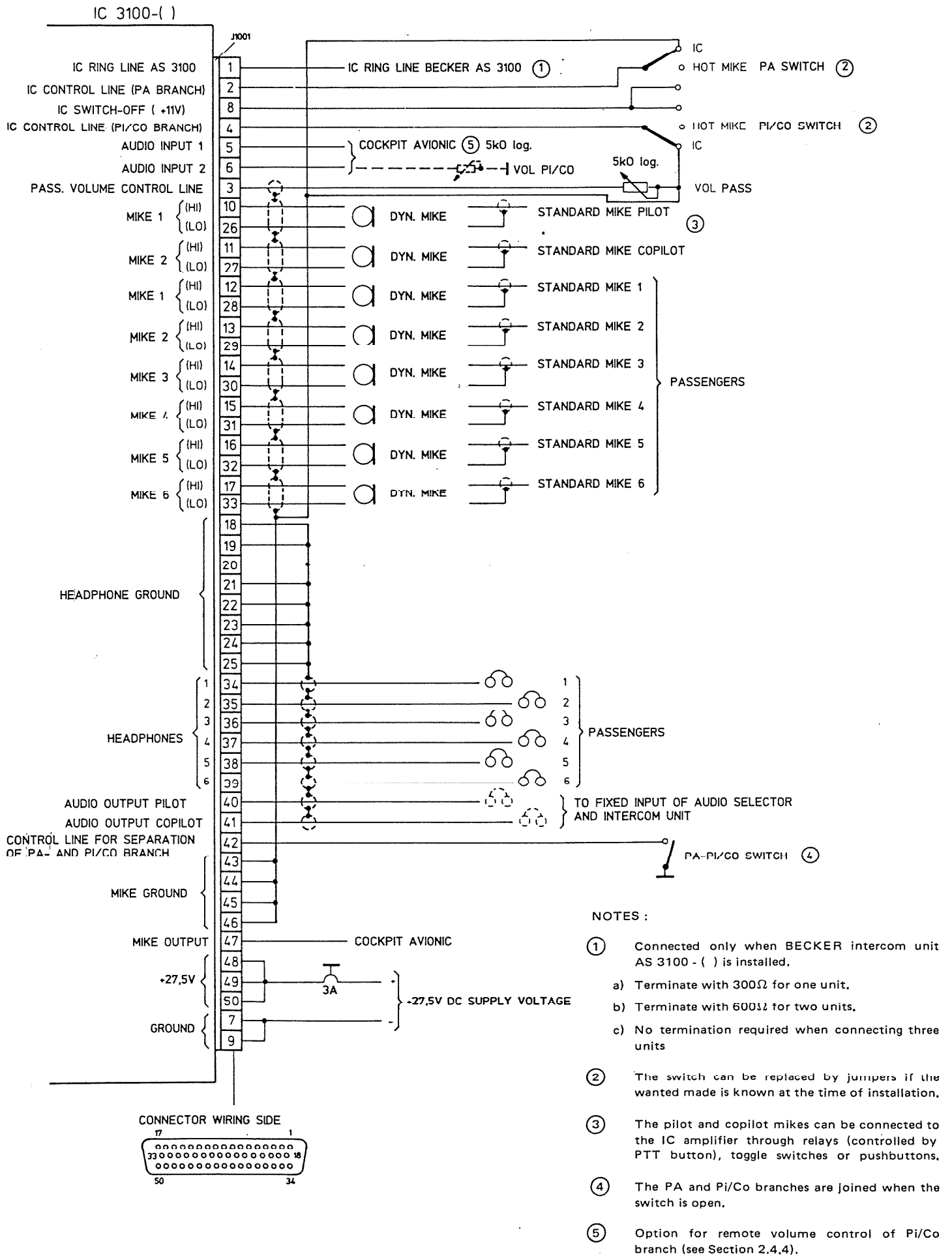


Fig. 2-2

Wiring proposal for IC amplifier IC 3100 - ()

NOTE

Depending on the model of IC amplifier used, variable resistors can be incorporated, the corresponding tapings then being missing in the chassis of the unit despite complete labelling.

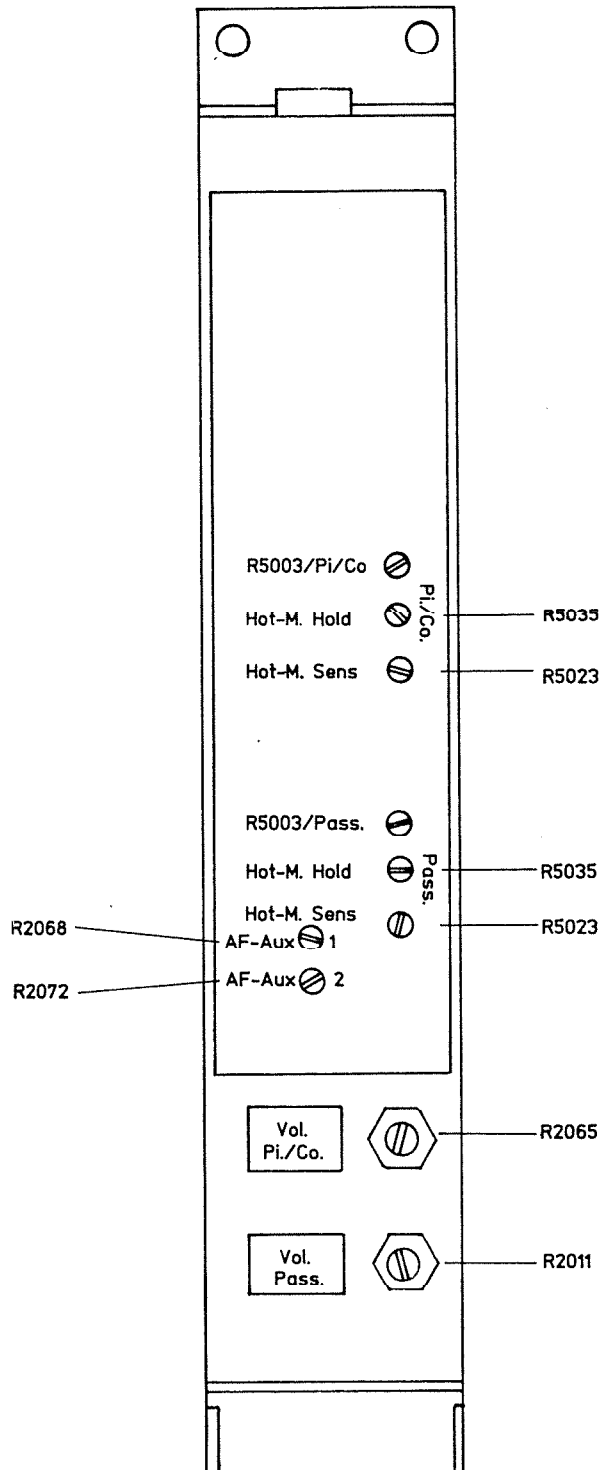


Fig. 2-3 Locations of the variable resistors

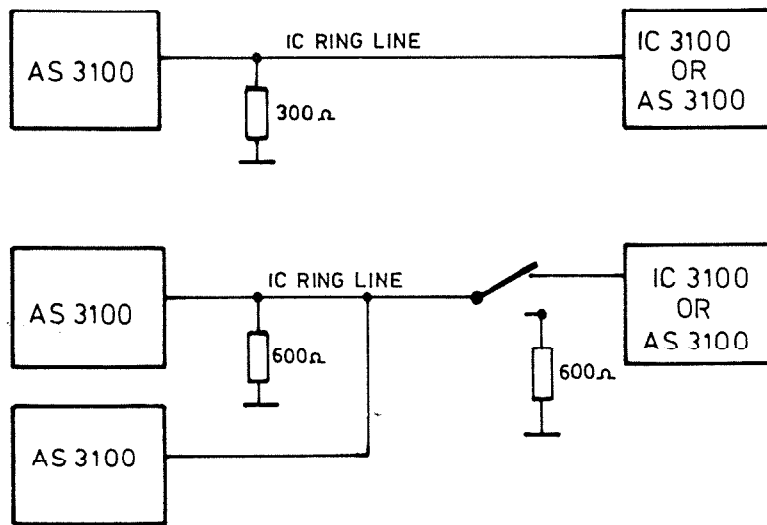


Fig. 2-4 Examples for IC ring line adapting

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THEORY OF OPERATION

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4.1 Description of block diagram

The description of the block diagram Fig. 4-1 explains the basic functions of the IC amplifier IC 3100 - ().

4.1.1 PA branch

The PA branch provides connections for max. 6 headsets which are intended for the passengers. Groups of three microphone signals are formed and amplified accordingly in a mike amplifier module. Depending on the model, the IC amplifier comprises mike amplifiers for standard microphones or for dynamic microphones. Models IC 3100 - (5) and IC 3100 - (6) do not have any mike amplifiers, since max. 2 standard microphones can be connected to the PA branch in this case.

The microphone signals pass through the amplifier stage T 2001 to the HOT MIKE module. The latter contains a threshold switch which sends the microphone signals to the speaker amplifier using voice control. In the case of lengthy breaks in communication, the connection is thus cut off automatically so that no parasitic noise will be transmitted.

When the IC control line of the PA branch is applied to ground through an external switch or through a PTT button the threshold control is suppressed in favour of normal IC operation (voice paths permanently open or keyed).

The IC control line of the PA branch can be applied to + 11 V through an external switch in order to stop aircraft intercommunication between passengers (HOT MIKE and IC operation) (IC cut-off + 11 V).

The speaker amplifier module serves to amplify the microphone signals to a power output which allows max. 6 earphones to be connected. The sensitivity of the speaker amplifier can be adjusted at R 2011. A volume control line is run to the unit connector for an external volume adjustment or for an external muting circuit.

4.1.2 Pilot/copilot branch

The pilot/copilot branch provides connections for max. 2 headsets intended for the cockpit crew. The microphone signals are amplified in a mike amplifier module. Depending on the model, the IC amplifier comprises a mike amplifier for standard microphones or for dynamic microphones. Model IC 3100 - (5) does not have a mike amplifier, since max. 2 standard microphones can be connected to the pilot/copilot branch in this case.

The microphone signals reach the HOT MIKE module and pass through C 2053 to an external microphone output. As in the PA branch, the HOT MIKE module with its threshold switch again enables the microphone signals to be transmitted by voice control. The pilot/copilot branch can also be switched over to IC operation or cut off entirely, using an IC control line.

The microphone signals are delivered to the speaker amplifier module through the buffer amplifier T 2052. The sensitivity of the speaker amplifier can be adjusted at R 2065. Having been amplified accordingly, the audio signal reaches the two earphones of the pilot/-copilot branch.

The IC amplifier additionally incorporates two AF inputs for cockpit avionics, the audio signals being passed through the variable resistors R 2068 and R 2072 to the speaker amplifier input of the pilot/copilot branch.

NOTE

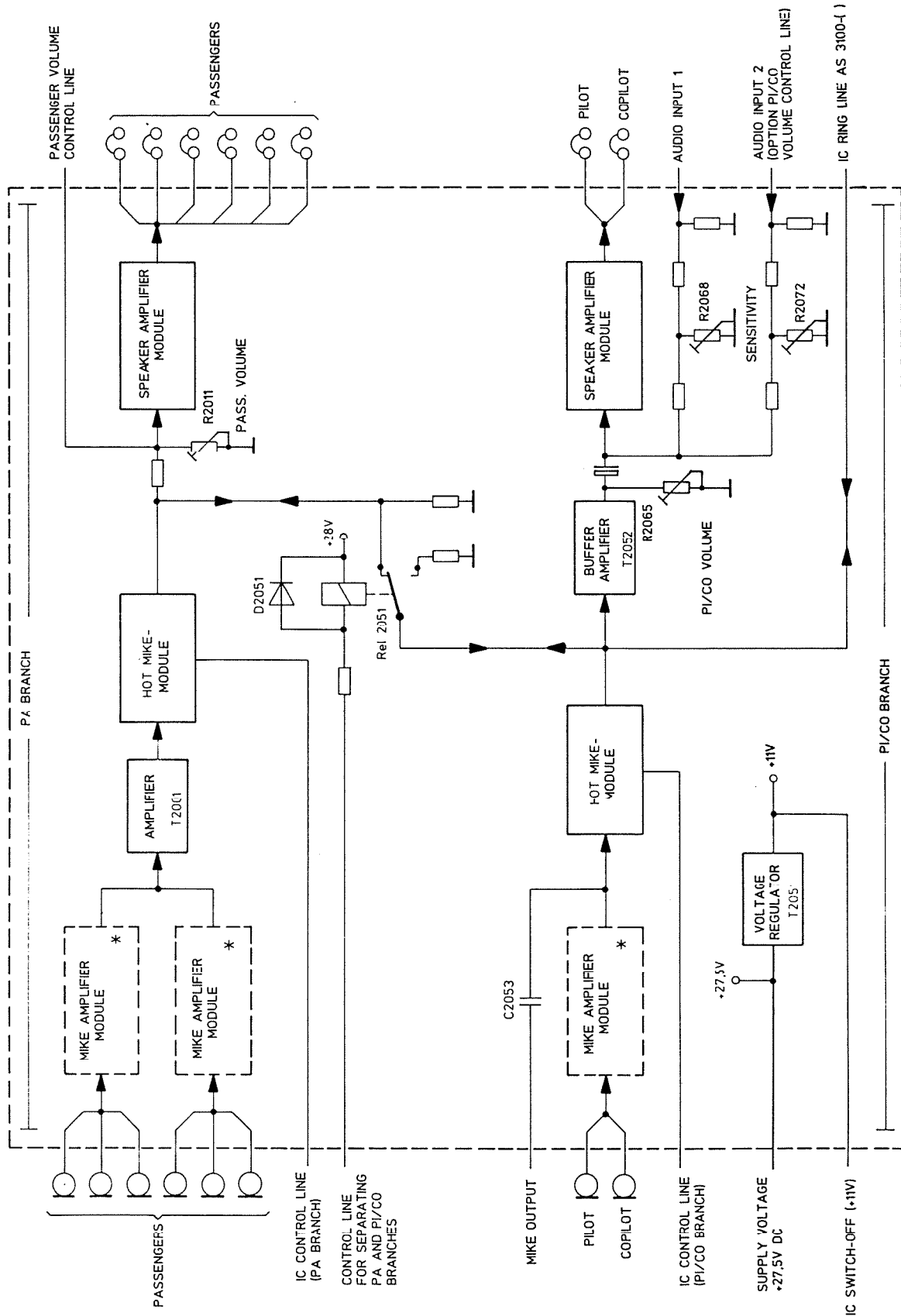
AF input 2 can be retrofitted for remote Pi/Co volume control, if required (see Section 2.4.4).

4.1.3 Separation of PA branch and pilot/copilot branch

The PA branch and pilot/copilot branch are normally joined together, i.e. aircraft intercommunication is possible between the cockpit crew and passengers. When the two branches need separating the control line provided for this purpose has to be switched to ground through an external switch. The relay Rel. 2051 then picks up and switches to its ON position, separating the PA branch from the pilot/copilot branch.

4.1.4 Voltage regulator

The voltage regulator T 2051 receives the supply voltage of + 27.5 V and delivers the module operating voltage of + 11 V to its output. The voltage of + 11 V is applied also to the unit connector so that the two aircraft intercommunication branches (PA and pilot/-copilot) can be cut off through separate control lines, using an external switch (IC cut-off).



* MIKE AMPLIFIERS NOT INCLUDED IN VERSIONS IC 3100-(5) AND IC 3100-(6)

Fig. 4-1

Block diagram of the IC amplifier IC 3100. - ()

