Installation Guide

T942C and T942C/2 Central Unit

Contents

1 Central Unit T942C

T942C is used in the Ascom Paging System. T942C controls all communication on the system bus and data buses. The Central Unit also generates code to all H/U952T Terminal Transmitters and enables parallel operation of separate installations. All the inputs and outputs have transient protection, and all bus connections are equipped with chokes for increased EMC protection.

Figure 1. Central Unit T942C.

Supply voltage: 12.5 V DC ± 10 %

Current consumption: Max 1 A

IMPORTANT: Protect the unit against current exceeding 20 A. Use power cables with cross-section 3 mm^2.

NOTE: For 541293A, rev. 3A or later, and T942C2, rev 2A or later: Ferrite beads must be mounted on all cables to fulfill EMC regulatory requirements (see figure 2).
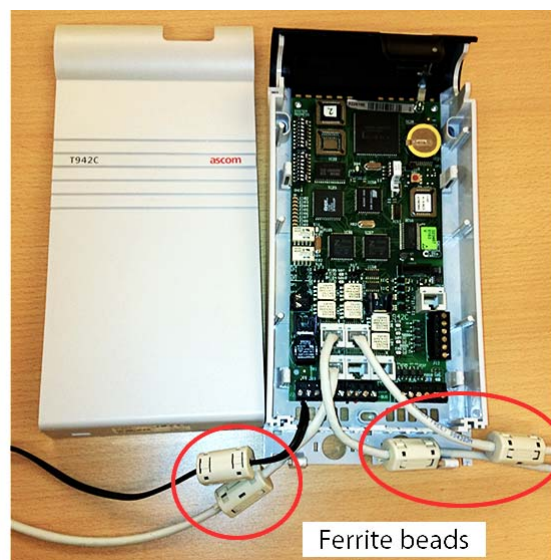

Figure 2. Central Unit with cover removed and ferrite beads mounted on cables.

Delivery includes:

- T942C
- Modular system bus cabling
- FP5 Fuse board 1.25A

Optional equipment that may be required:

- A PC can be connected to 8-pin modular connector J09 on the T942C for RS232C communication. Adapters can be ordered from Ascom for 9-pin and 25-pin D-sub connectors. See 1.4.10 Connection of PC on page 15.

Tools, etc., required:

- Screwdriver
- Cutting pliers
- Screws suitable for their purpose (wall-mounting)
- Multi-meter
- Portable Device Manager (PDM)

As a complement to this *Installation Guide*, see the *System Installation* document.

1.1 Regulatory Compliance Statements (EU/EFTA only)

Hereby, Ascom (Sweden) AB, declares that this equipment is in compliance with the essential requirements and other relevant provisions of EMC directive 2004/108/EC.

The declaration of conformity may be consulted at:
https://www.ascom-ws.com/doc/

1.2 Regulatory Compliance Statements (USA only)

FCC Compliance Statements

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the transmitting antenna.
- Increase the separation between the equipment and Receiver.
- Connect the equipment into an outlet on a circuit different from that to which the transmitter is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Information to User

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Modifications

Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
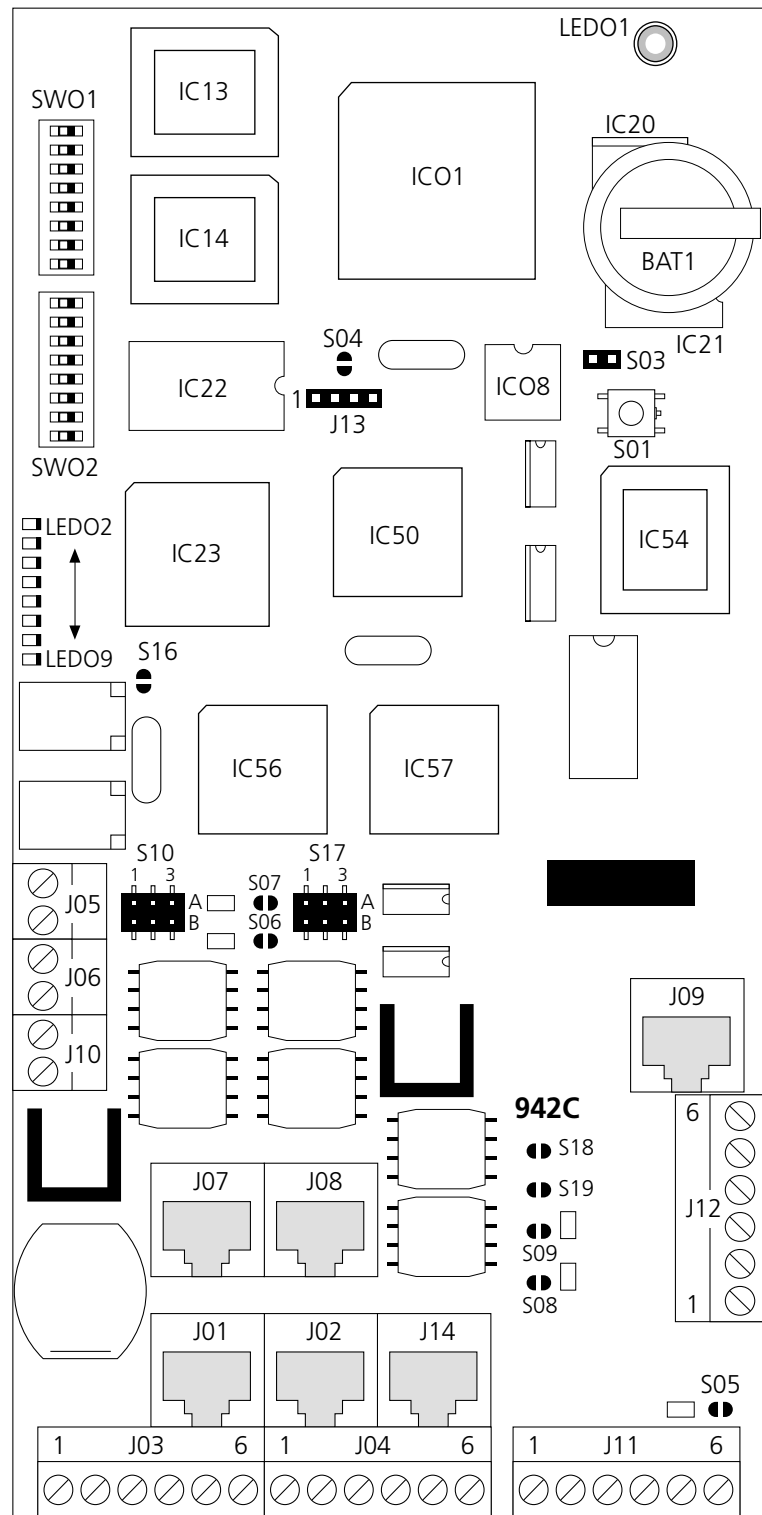
1.3   Board Description

Figure 3. T942C circuit board.

Connectors

J01, J02:	Modular jacks for connection of system bus cabling.
J03:	Supply voltage.
J04:	For connection of A, C, or D-bus via twisted-pair wiring when modular bus cabling cannot be used.
J05:	Not used.
J06:	Not used.
J07:	Not used.
J08:	Modular jack for connection of A-bus.
J09:	Modular jack for connection of PC-line, directly or via modem.
J10:	Connector where a relay output is available for system fault indication and Central Unit malfunction indication. Several parameters in the Central Unit software determine how the output is to be used. When the Central Unit and system are operating properly, the relay is actuated, the contacts for the output close, and LED06 lights steadily.
J11:	Connector for 4 external digital 12 V DC inputs. Inputs 2 to 4 are not used. Input 1 is used for monitor receiver H/U989M.
J12:	Connector for 4 external digital outputs (12 V DC) of type open collector. Output 1 is used only in paging systems for connection of Reference Module T938RM. Output 2 (and GND) is used to indicate that the H/U952T Terminal Transmitter is transmitting. Output 3 is used to indicate Central Unit malfunction. As long as the Central Unit is working properly, the output is low. Output 4 is not used.
J13:	Used for diagnostic testing.
J14:	Modular jack for connection of D, C, and DR-buses, and AUX RELAY.

Jumper points and push buttons

S01	Push button to manually restart the MP.
S03	2-pin connector, must be jumpered to connect RAM back-up battery.
S04, S18, S19	Not used.
S05	Not used.
S06, S07	Not used.
S08	Not used.
S09	Not used.
S10A	Jumper. Normally must be set to position 1-2 to connect 1 kohm matching resistor across AUX SP bus.
S10B	Jumper. Normally must be set to position 1-2 to select normally closed contact of AUX RELAY RE02. (2-3 selects normally open contact.)
S16	Not used.
S17A	Jumper. Always set to 2-3 to select RS485 for the Ascom Paging System.
S17B	Jumper. Always set to 1-2 to select RS485 for the Ascom Paging System.

Switches

SW01   Address selector switch for the C-bus. If the setting of SW1 is changed the Central Unit must be restarted for the change to become effective.

SW02   If the settings of sections 1, 3 or 4 on switch SW2 are changed, the Central Unit must be restarted for the change to become effective. Section 1 is set to ON if a PC (connected to connector J09) equipped with PDM or other special program, is to be used according to the PC line protocol.
If section 1 is set to OFF, a PC equipped with a terminal emulating program can be used as an aid at the installation test procedure and for service.
Section 2 is used for test pagings (ON = Test pagings on, OFF = Test pagings off). Section 2 is normally set to OFF.
Section 3 determines if the parameter list is to be read from the non-volatile memory or from the FLASH PROM (ON = Read from the non-volatile memory, OFF = Read from the FLASH PROM). Section 3 is normally set to OFF when the configuration of parameters is done in PCPAR.
Section 4 determines if the non-volatile memory is to be reset or not after restarting the Central Unit (ON = Reset, OFF = Reset not). Section 4 is normally set to OFF.
Sections 5 is used for ''off licensed mode''.
Sections 6-8 are not used and are set to OFF.

LEDs

LED01A   Green function indicator.

LED01B   Red function indicator.

LED02   BCP communication in progress.

LED03   Paging systems: Synch. data transmission in progress on D-bus.

LED04   Communication in progress between MP and BCP.

LED05   Not used.

LED06   Aux. relay output (on connector J10) is active.

LED07   Not used.

LED08   Indicates transmission to external computer (J09).

LED09   Indicates reception from external computer (J09).

IC-Circuits

IC01   Microprocessor, type 80C188EB.

IC08   Module key.

IC13, IC14   FLASH PROMs, contain the software for IC14: the main processor.

IC22   RAM memory with battery backup.

IC54   FLASH PROM, contains the software for the communication processor.
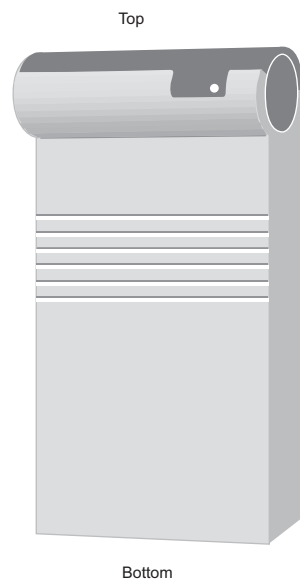
1.4   Installation

T942C should be placed in a dry environment with a temperature range of 0 to +40°C.

1.4.1   Mounting

IMPORTANT: The unit must be mounted by trained personnel.

IMPORTANT: The unit must be mounted to a solid vertical wall with the bottom facing the floor.

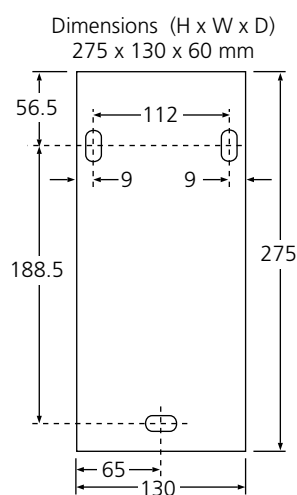The illustration below shows the dimensions in mm for mounting the unit.

Figure 4. Mounting dimensions in mm.

NOTE: To facilitate service after the unit is installed, we recommend a free space of about 150 mm above and 50 mm below the unit.

1.4.2   Opening the Housing

Use a screwdriver or similar to release the cover by applying a light pressure to the two snap catches (1) and remove the cover (2).
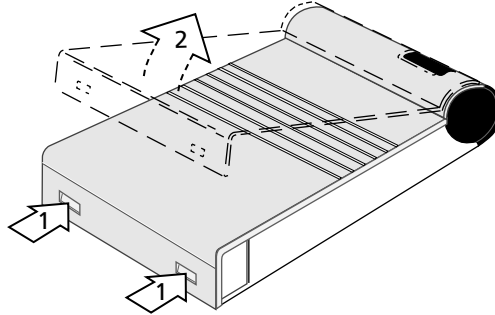

Figure 5. Releasing the cover.

Opening the Housing from the Front

If the housing has to be mounted without sufficient space below it, the cut-out holes in the housing lid should be opened to facilitate maintenance.
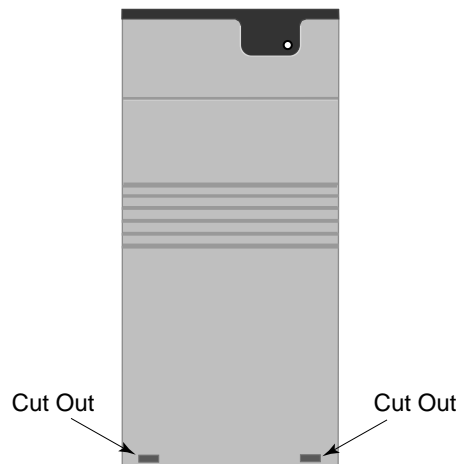

Cut Out   Cut Out

Figure 6. Cut outs for opening the cover.

When the holes are opened, a screwdriver can be used to open the lid. Apply a slight downward pressure (1), then gently lever the screwdriver downwards (2), the clips which hold the lid will then be released and the cover can be removed (3).

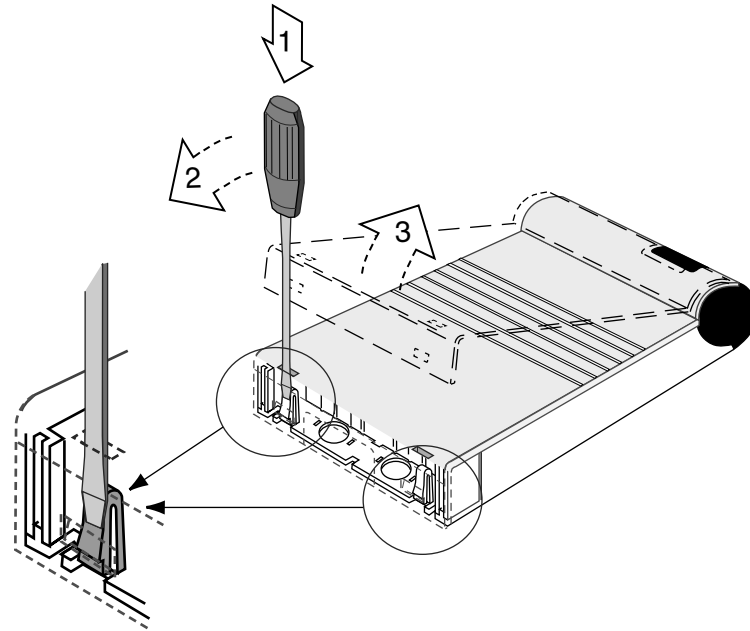*Figure 7. Removing the cover.*

To replace the circuit board, see 1.6 Circuit Board Replacement on page 19.
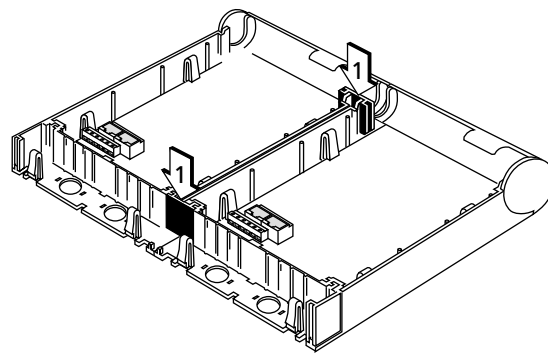
1.4.3 Mounting Together with Other Units

Figure 8. Mounting with other units.

1   Remove upper and lower covers. The lower rectangular covers are used to fasten units to each other (1).

2   Fasten the module with three screws, see 1.4.1 Mounting on page 7.

1.4.4   Wiring Runs

Wiring can be run three ways from the unit:

• Remove the rectangular covers and run the cabling out through the side (1).
• Run the cabling through the round holes at the back of the case (2).
• Remove the circular covers at the top of the side case (3).
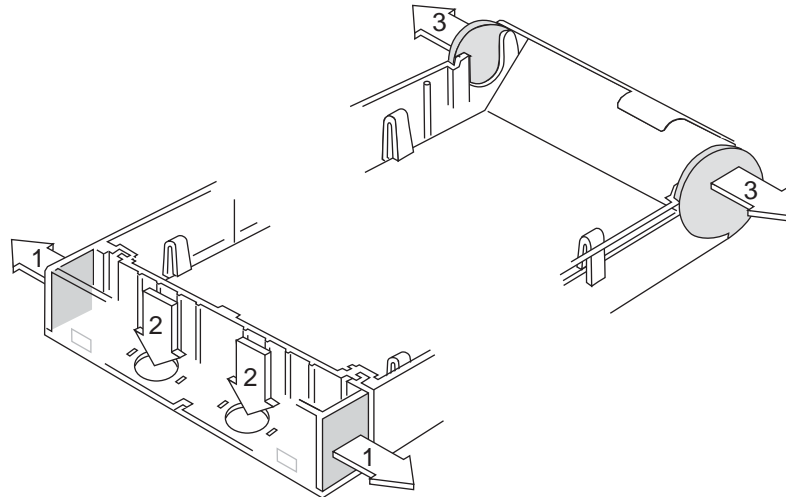
IMPORTANT: Do not make any openings at the bottom of the front cover since this does not comply with the fire enclosure requirements.

The plastic partition is scored to facilitate breaking at convenient intervals.
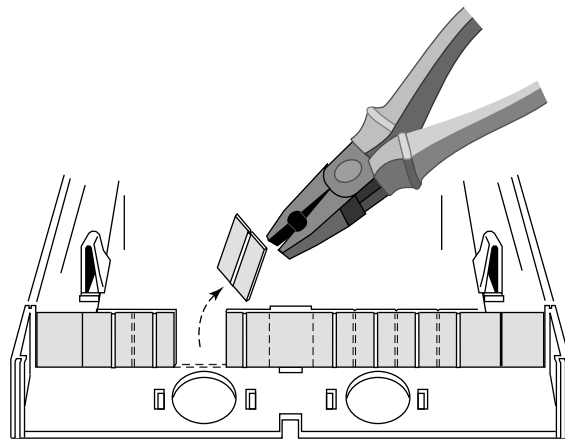
1   Use pliers to break off a suitable section.

Figure 9. Scored plastic partition for breaking.

2   Run the wiring out through the partition.
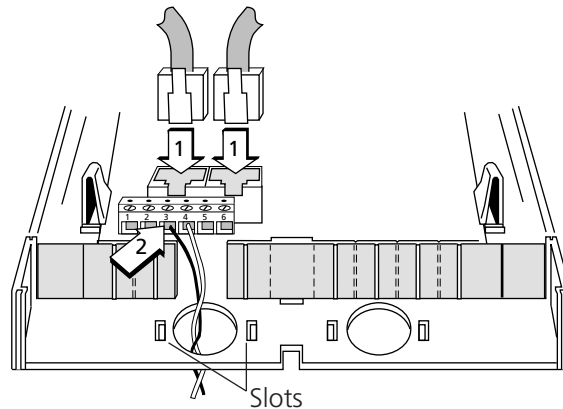
Figure 10. Wiring of modular or twisted pair cabling, 1 and 2.

3   Use the slots at the opening to secure the wiring with cable straps.

1.4.5   Addressing

Assign the T942C an address on the C-bus by setting address switch SW01 hexadecimally. See the *System Installation* document, chapter Addressing.

Figure 11. Addressing on T942C

- If no additional units are connected to the C-bus: Assign the Central Unit address 00.
- If additional units are connected to the C-bus, the address must not be the same as any other unit on the C-bus. Note that units on the C-bus must always be assigned addresses in ascending order starting with 00.

1.4.6 Connection of Buses

Buses are connected either via modular bus cabling or twisted-pairs.

NOTE: The data buses are polarized. Use only twisted-pairs for two-wire connections!
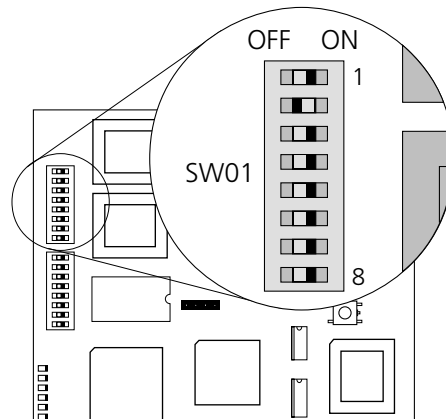
Bus connection via Modular Bus Cabling

See figure 12 on page 12 for information about modular bus connectors.

1   Connect modular bus cabling to J01 and J02.

2   Connect additional modular bus cabling:

J14: connect only the C-bus to another Central Unit via a quick-connect terminal block (type Krone)

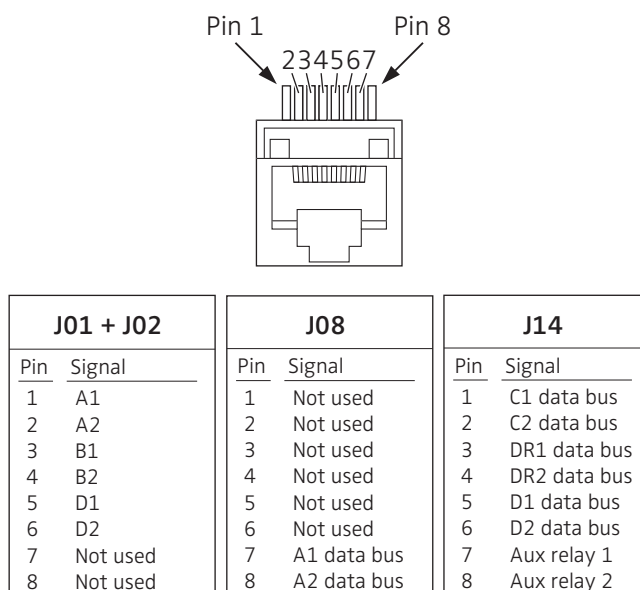| J01 + J02		J08		J14	
Pin	Signal	Pin	Signal	Pin	Signal
1	A1	1	Not used	1	C1 data bus
2	A2	2	Not used	2	C2 data bus
3	B1	3	Not used	3	DR1 data bus
4	B2	4	Not used	4	DR2 data bus
5	D1	5	Not used	5	D1 data bus
6	D2	6	Not used	6	D2 data bus
7	Not used	7	A1 data bus	7	Aux relay 1
8	Not used	8	A2 data bus	8	Aux relay 2

Figure 12. Modular connectors J01, J02, J08 and J14.

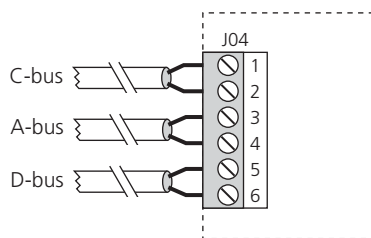**Bus connection via twisted-pairs**

Figure 13. Twisted-pairs connection.

- A-bus to J04 screw 3 and 4.
- C-bus to J04 screw 1 and 2.

1.4.7 Connection of Supply Voltage

1. Add the FP5 Fuse board 1.25A, a very-fast acting (FF) fuse, to the circuit board, in between connector J03 and the screw terminal.

2. Connect the supply voltage to connector J03 screw 1 and 2.

   See the *System Installation* document, chapter Power Supply.

Figure 14. Connector J03

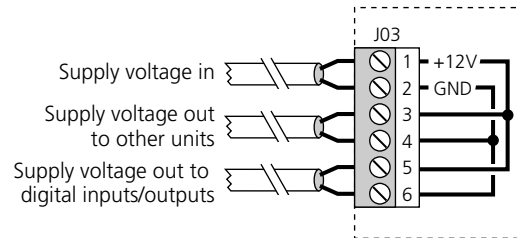NOTE: If the digital inputs and outputs are to be used they must be provided with supply voltage.

3. Supply the digital inputs and outputs with voltage via connections between J03 and J11/J12 (see drawing below).
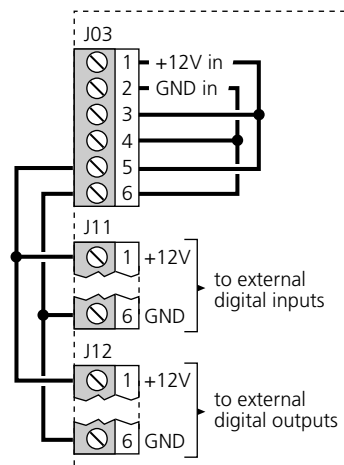

Figure 15. Connection of digital inputs or outputs.

If galvanic isolation is required, remove the connections between J03 J11/J12, and connect a separate power supply to J11/J12.

1.4.8 Connection of Reference Module in a FL-System (used only in paging systems)

Connect a *twisted-pair* from connector J12 screw 6 and 2 to Reference Module T938RM connector J04 screw 5 and 6, respectively (polarized!).
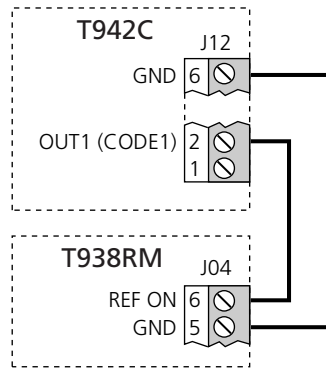

Figure 16. Connection of the Reference Module to the Central Unit.

NOTE: The digital outputs must be provided with supply voltage, see 1.4.7 Connection of Supply Voltage on page 13.

1.4.9 Connection of Monitor Input

In some cases it may be desirable to prevent the H/U952T Terminal Transmitters from transmitting, e.g. when a carrier wave is already in the air.

Monitor input can be used to prevent the Central Unit both from activating the output stage in the transmitters and from sending the transmitter code to them when a carrier wave is in the air.

Connect a twisted-pair from the monitor source to the Central Unit (connector J11, screws 1 and 2).
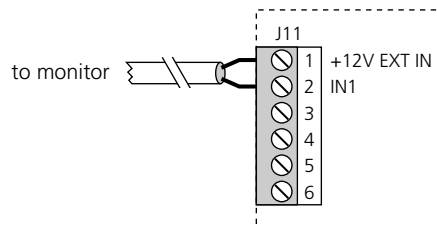
Figure 17. Monitor connection.

NOTE: The digital inputs must be provided with supply voltage, see 1.4.7 Connection of Supply Voltage on page 13.

1.4.10 Connection of PC

The serial communication port on the PC is to be connected to 8-pin modular connector J09 on the T942C, either directly or via modems. (See the drawings below.)

Figure 18. 9-pin modular connector.

Figure 19. 25-pin modular connector.

NOTE: Note that on modems with 25-pin D-sub connectors, the RTS and CTS signals must be jumpered - i.e. pin 4 to 5.

Adapters with the correct connections can be ordered from Ascom for both the 9-pin and 25-pin D-sub connectors.

1.4.11 Relay Output for System Fault Indication

A relay output on connector J10 is used to indicate Central Unit malfunction and can also be used to indicate system fau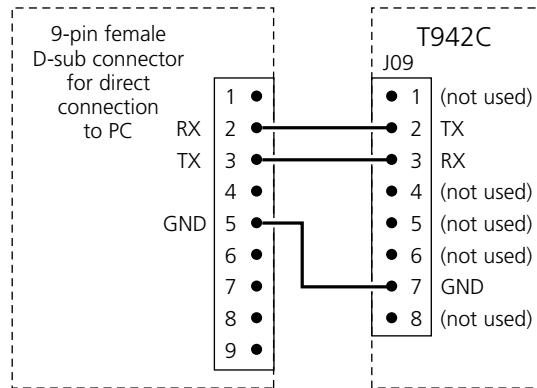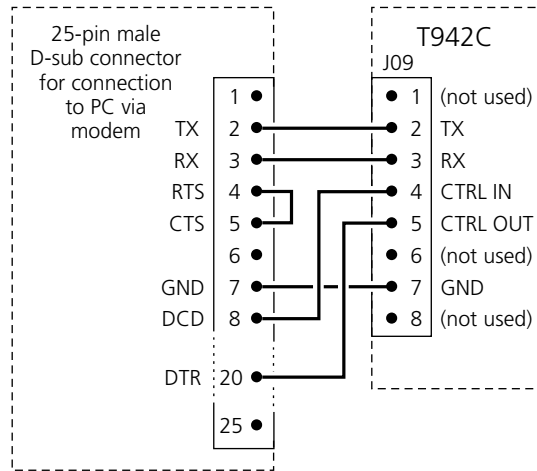lt (e.g. system fault can be when a module drops out or reports an error). Several parameters in the Central Unit software determine how the output is to be used.
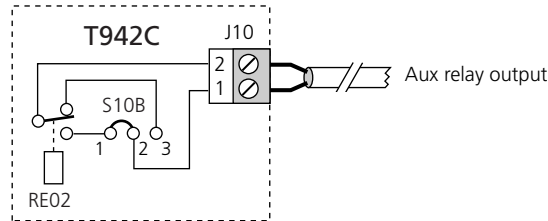

Figure 20. Relay output connector.

If the relay output is set to indicate system fault it is possible to use output 3 on connector J12 to indicate Central Unit malfunction only, see the next section 1.4.12 Central Unit Malfunction Output on page 16.

As long as the Central Unit and system are operating properly the relay is actuated and has a make-function.

NOTE: At power-up or restart of the Central Unit the relay is deactuated for about 20 seconds. If the relay is deactuated for more than 20 seconds either the Central Unit or system is malfunctioning.

1.4.12 Central Unit Malfunction Output

If the relay output on connector J10 is used to indicate both Central Unit malfunction and system fault then output 3 on connector J12 (screw 4) can be used to indicate Central Unit malfunction only.
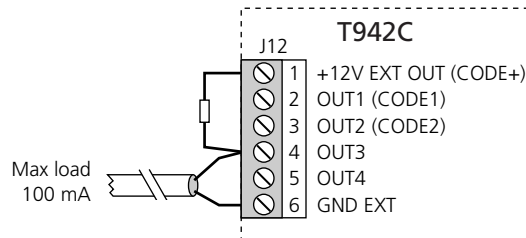
Figure 21. Connection of Central Unit malfunction only on pin 3 on J12.

The output capacity is max 100 mA and is of open collector-type, which means that to produce a digital 12V signal a resistor must be connected between the output and +12V (screw 1). If a digital signal is not wanted a relay can be connected between the output and +12V.

As long as the Central Unit is operating properly the output is actuated.

NOTE: At power-up or restart of the Central Unit, the output is deactuated for about 20 seconds. If the output is deactuated for more than 20 seconds the Central Unit is malfunctioning.

1.4.13   Activation of Power Changeover Circuit

Activate the RAM back-up battery by closing jumper S03 on the circuit board.
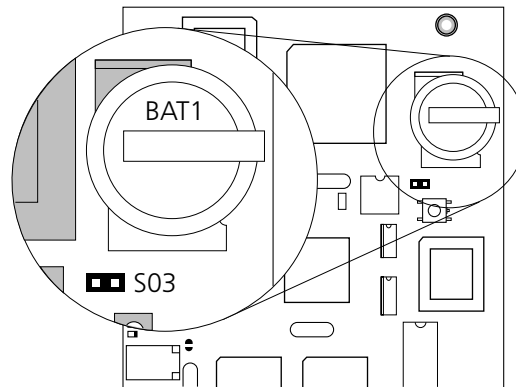
Figure 22. The RAM back-up battery.

NOTE: The power changeover circuit contains a 3V lithium battery. At any interruption in the ordinary +5V supply, both the RAM and real-time clock will be supplied by the battery so that they retain their data.

Data

Current consumption, RAM and real-time clock:

• 3 V battery: typical 2 µA, max 40 µA

Battery life (battery connected):

• 5 V not connected: typical 7 years, min. 0.5 years
• 5 V connected: minimum 10 years

Battery life (battery not connected):

• min. 10 years

1.5   Installation Test Procedure

For better indication of whether the system is operating properly or not, a PC equipped with a terminal emulating program can be connected to connector J09 (see 1.4.10 Connection of PC on page 15). Section 1 on switch SW02 must then be set in position OFF.

1   Check that sections 2, 3 and 5-8 on switch SW02 are set to OFF. If reset of the non-volatile memory is desired when restarting the Central Unit, SW02 section 4 must be set to ON, otherwise it is set to OFF.

Check that jumper S03 is jumpered, and jumpers S17A and S17B are set as follows:

S17A: position 2-3

S17B: position 1-2

Check if jumper S10A is to be jumpered or not.

2   Check that SW01 is set to the correct address and SW02 is set for desired parameters, and that module key IC08 is installed.

Units with S942C Software

3   Energize all the units in the system. Function indicator LED01 on T942C should light red for about 1 second and then change to a flashing orange.

Function indicator
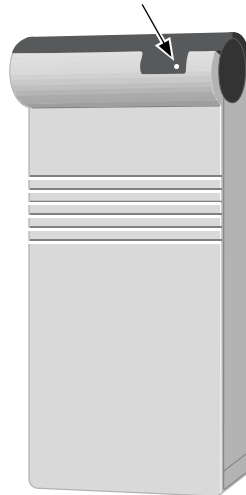
Figure 23. Function Indicator.

At start-up the Central Unit begins with a short self-test for a few seconds. The function indicator indicates this by short blinks at one second intervals. The parameter list in the FLASH PROM is copied to the non-volatile memory.

If no faults are detected, the Central Unit then makes a survey of the modules connected to the data buses. The function indicator blinks rapidly (orange - 5 times/second) until all data buses are surveyed. After this the function indicator lights steadily.

If it continues to indicate with a steady red, check that supply voltage is 12.5 V DC ± 10%.

Flashing indicates a fault as follows:

Color	ON	OFF	Fault
red	100 ms	800 ms	Incorrect software licence *
green	800 ms	100 ms	Parameter fault
red	1 s	1 s	Watchdog reset

4   If everything seems to be OK but the function indicator still blinks, the fault is probably located outside the T942C module. Check the other system units according to the document System Installation or contact your dealer.

5   If section 4 on SW02 is set to ON it must be switched to OFF.

6   Set section 3 on SW02 to ON. Restart T942C by pressing push button S01. The parameter list will now be read from the non-volatile memory and any new parameter list can be loaded into the non-volatile memory from a PC equipped with PDM.

7   Replace the cover.

When all other units are installed, perform the system test described in the *System Installation* document.

1.6   Circuit Board Replacement
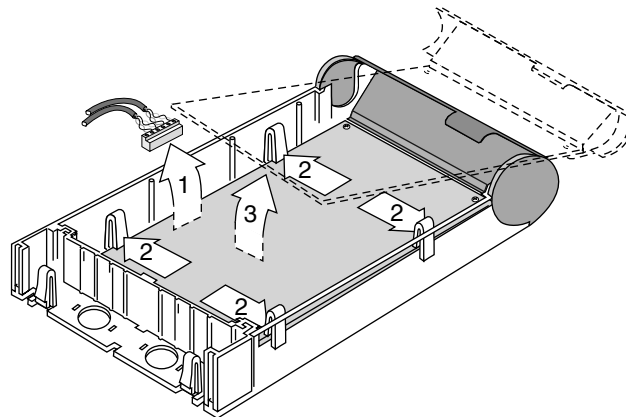
Figure 24. Circuit board replacement.

1   Disconnect the power supply.

2   Remove the cover, see 1.4.2 Opening the Housing on page 8.

3   Lift off the screw connectors from the circuit board (1).

4   Press the four holding clips (2) and release the circuit board (3).

5   Install the new circuit board in the case, make sure it clicks into the position.

6   Set all switches and jumpers as they were on the old circuit board.

7   Replace the connectors.

8   Reinstall the applicable software.

9   Check installation according to 1.5 Installation Test Procedure on page 18.

10   Replace the cover.

2   Central Unit T942C/2

Figure 25. Central Unit T942C/2

2.1   General

The Central Unit T942C/2 is a simplified version of the T942C and is used in small Ascom Paging Systems. It controls all communications on the system bus and data buses. It also generates code to all H/U952T Terminal Transmitters. All inputs and outputs have transient protection, and all connections are equipped with chokes for increased EMC protection.

Supply voltage: 12.5 V DC ± 10 %

Current consumption: Max 1 A

IMPORTANT: Protect the unit against current exceding 20 A. Use power cables with cross-section 3 mm2.

Delivery includes

- T942C/2
- Modular system bus cabling
- FP5 Fuse board 1.25A

Tools, etc., required

- Screwdriver
- Screws suitable for their purpose (wall-mounting)
- Cutting pliers
- Multi-meter

As a complement to this *Installation Guide*, see the *System Installation* document.

2.2   Regulatory Compliance Statements

Refer to T942C, see 1.1 Regulatory Compliance Statements (EU/EFTA only) on page 2 and 1.2 Regulatory Compliance Statements (USA only) on page 2.
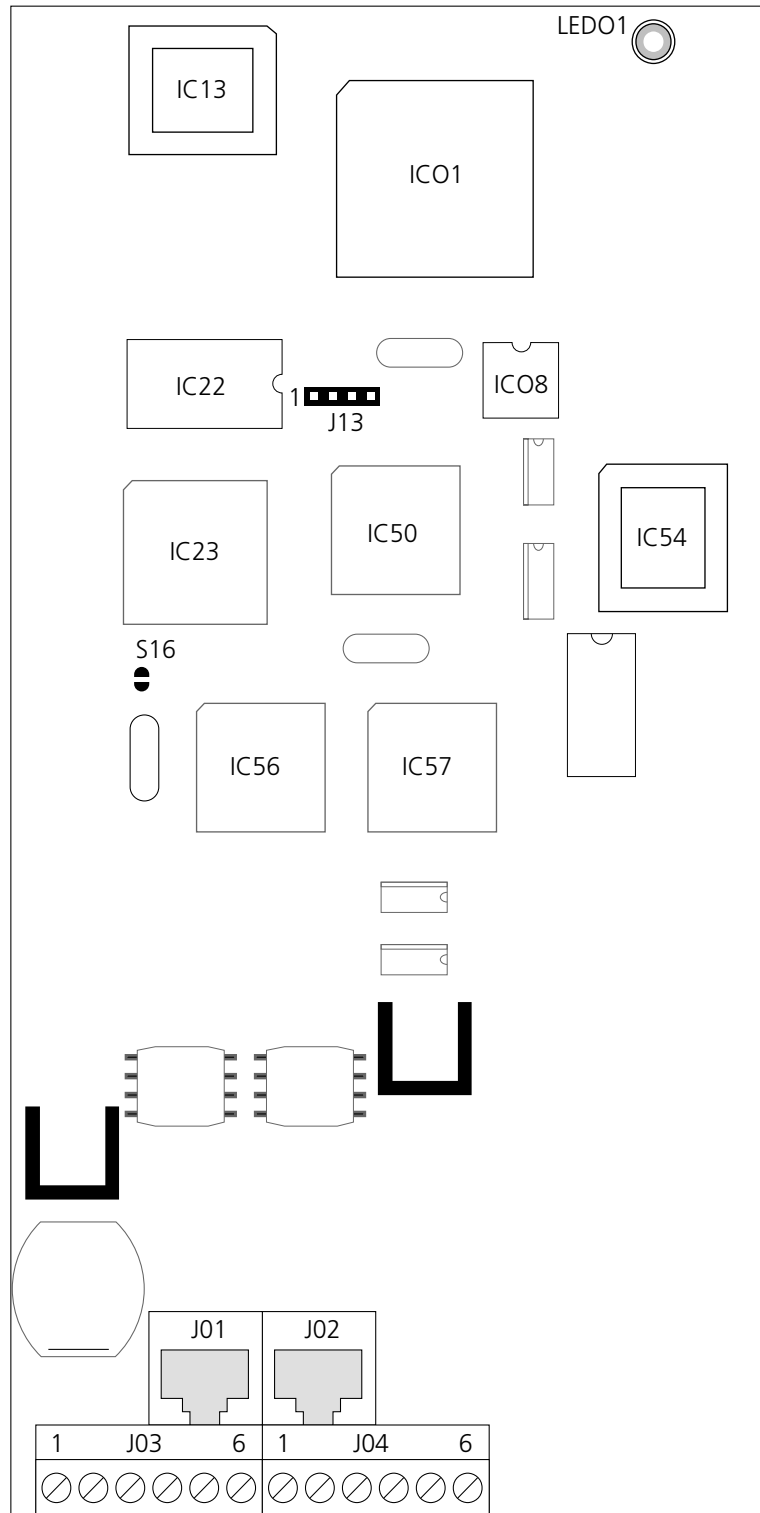
2.3   Board Description

Figure 26. Circuit board T942C/2.

Connectors

J01, J02	Modular jacks for connection of system bus cabling.
J03	Supply voltage.
J04	For connection of A or D-bus via twisted-pair wiring when modular bus cabling cannot be used.
J13	Used for diagnostic testing.

Jumpers

S16	Not used.

LEDs

LED01	(Two LEDs combined in one); LED01A Green function indicator and LED01B Red function indicator.

IC-circuits

IC01	Microprocessor, type 80C188EB.
IC08	Module key.
IC13	FLASH PROM contains the software for the main processor.
IC22	RAM memory.
IC54	FLASH PROM, contains the software for the communication processor.

2.4 Installation

2.4.1 Mounting

Refer to T942C, see 1.4.1 Mounting on page 7.

2.4.2 Opening the Housing

Refer to T942C, see 1.4.2 Opening the Housing on page 8.

2.4.3 Mounting Together with Other Units

Refer to T942C, see 1.4.3 Mounting Together with Other Units on page 9.

2.4.4 Wiring Runs

Refer to T942C, see 1.4.4 Wiring Runs on page 10.

2.4.5   Connection of Buses

Buses are connected either via modular bus cabling or twisted-pairs.

NOTE: Data buses are polarized! Use only twisted-pairs for separate wiring!
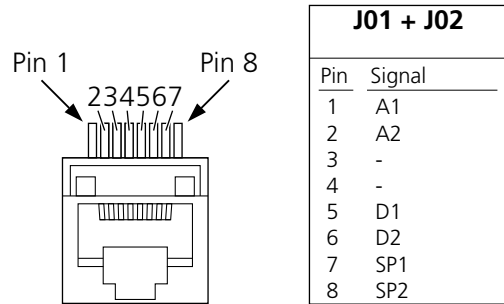
Bus Connections via Modular Bus Cabling

Figure 27. Modular bus cable pins.

- Connect the modular bus cabling to connectors J01 and J02.

Bus Connections via twisted-pairs
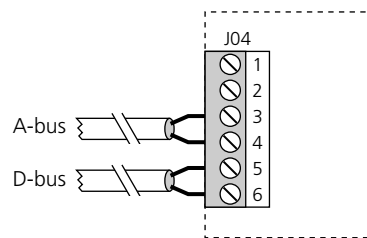
Figure 28. Twisted-pairs connection.

- A-bus to J04 screw 3 and 4
- D-bus to J04 screw 5 and 6

2.4.6   Connection of Supply Voltage

1   Add the FP5 Fuse board 1.25A, a very-fast acting (FF) fuse, to the circuit board, in between connector J03 and the screw terminal.

2   Connect supply voltage to connector J03 screw 1 and 2. See also the System Installation document, under Power Supply.
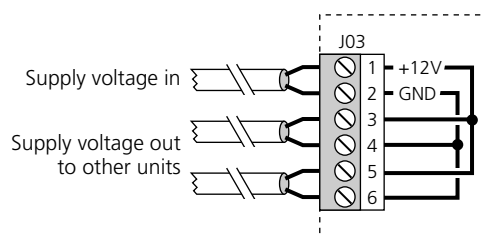

Figure 29. Power supply connection.

2.4.7   FLASH PROMs Containing Software for the Main and Communication Processors

1   Press the FLASH PROMs containing the software for the main processor, onto IC-socket IC13.

2   Press the FLASH PROM containing the S942C software for the communication processor, onto IC-socket IC54.

2.5   Installation Test Procedure

S942C software

Energize all the units in the system. Function indicator LED01 on T942C/2 should light red for about 1 second and then change to a flashing orange light.

Figure 30. Central Unit T942C/2

At a start-up the Central Unit begins with a short self test for a few seconds. The function indicator indicates this by short blinks at one second intervals. The parameter list in the FLASH PROM is copied to the memory.

If no faults are detected, the Central Unit then makes a survey of the modules connected to the data buses. The function indicator blinks rapidly (orange - 5 times/second) until all data buses are surveyed. After this the function indicator lights steadily.

If it continues to indicate with a steady red, check that supply voltage is 12.5 V DC ± 10%.

Flashing indicates a fault as follows:

Colour	ON	OFF	Fault
red	100 ms	800 ms	Incorrect software licence*
green	800 ms	100 ms	Parameter fault
red	1 s	1 s	Watchdog reset

*All T942C/2 software is licenced and must be ordered.

2.6   Circuit Board Replacement

Refer to T942C, see

3 Programming T942C Central Unit

NOTE: This section is not applicable for the T942C/2 Central Unit.

The programming of T942C shall only be performed by the system administrator which sets parameters and relevant functions in the Central Unit to customize its functionality.

The Central Unit is programmed by using a computer containing the software application Portable Device Manager (PDM).

For more information on how to use PDM, see *Installation and Operation Manual, Portable Device Manager, Windows version, TD 92325GB.*

3.1 Preparations in PDM

To be able to connect the Central Unit, some parameters must be set in PDM. Otherwise, the Central Unit will not appear in the PDM.

1   Select Options > Preferences.
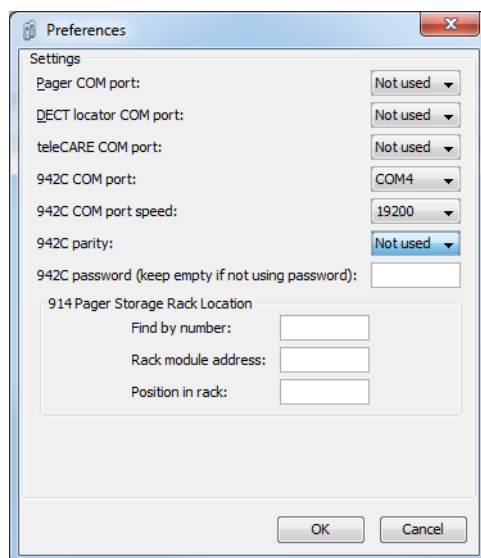
2   In the *942C COM port* drop-down list, select which COM port the Central Unit will use on the computer running PDM.

3   In the *942C COM port speed* drop-down list, select baud rate the Central Unit will use.

4   In the 942C parity drop-down list, select which parity bit to be used.

NOTE: The same parity bit must also be set in the Central Unit. Additionally, PDM requires that 8 bits and 1 stop bit are set in the Central Unit.

5   If the Central Unit is password protected, the same password configured in the Central Unit must be entered in the *942C password* text field.

3.2 Configuration

This chapter describes settings in parameter definition files (.def). These files are regularly updated and settings may change slightly. For example "On" to "Enable" or a parameter can be moved to another directory.

To be able to view the parameters of the Central Unit, do the following in PDM:

1   Select the *Numbers* tab

2   Right-click the T942C Central Unit to be configure in the list.

3   Select "Edit parameters".

3.2.1   Set License

This chapters describes how to set the license on a Central Unit delivered with factory settings. That is, a Central Unit without any parameters set. A valid license is required to set the parameters in the Central Unit.

1   Set section 5 on SW02 to ON. This is the setting for unlicensing mode.

2   Restart T942C by pressing push button S01.

The function indicator will flash red after the start up.

3   Connect the Central Unit's to the computer running PDM. That is, attach the cable between the connector J09 to the computer's COM-port.

4   In the *Edit Parameter* dialog window in PDM, select "Licence".

5   In the *License* text field, enter the license.

6   Set section 5 on SW02 to OFF and press the reboot button on the Central Unit. It should now start in normal mode.

4   Document History

For details in the latest version, see change bars in the document.

Version	Date	Description
D	10 May 2012	
E	29 November 2012	Added: 3 Programming T942C Central Unit on page 25 Updated: PDM added throughout in the document.
F	13 January 2013	Updated: 3.1 Preparations in PDM on page 25: new 942C parity parameter added.
G	16 April 2015	Added: Added the following info in 1 Central Unit T942C on page 1: For 541293A, rev. 3A or later and T942C2, rev 2A or later: Ferrite beads must be mounted on all cables to fulfill regulatory requirements regarding EMC. (Issue AMCH-62) Added a photo showing ferrite beads mounted on cables. (Issue AMCH-62)