

Commissioning is carried out in a definite series of steps. One distinguishes between commissioning of a new installation and commissioning of an extension or alteration of an existing installation.

### 7.1 Safety precautions

All the conventional safety precautions which apply for work in electrical installations shall be observed during commissioning.

### 7.2 Commissioning of new installations

With new installation, it is usually necessary to adjust the interplay and inter-relationship between the motor drives, main contacts and auxiliary contacts of the switchgear. Once this is completed, the interlocking units can be commissioned one after the other, when they have all been installed as described in Section 6. The central unit is always commissioned first, then the feeder units.

#### 7.2.1 Central unit

- On closing the PROTECTIVE SWITCHES (m.c.b) FOR CONTROL AND FEED-BACK (see diagram, Figure 12, page 5/12) the switching device positions are fed into the interlocking unit via their auxiliary switches. The power supply module on the central unit remains OFF!

#### ● First check:

The semaphore indicator positions must agree with the actual position of the switching devices (e.g. OPEN) otherwise the connections must be interchanged!

This check must be carried out for all the switching devices which are connected to the central unit.

- Next, switch on the power supply for the central unit. The operating lamps of the power supply unit come on and the micro-computer stores the available data. Throughout this time (approx. 5 s) all the LED's on the manual control module (FGB) are on (F1 to F6 red, M1 to M3 yellow). Readiness for operation is indicated when the LED's on FGB go out and all the green LED's (DLL) on the processing unit and the serial coupling module come on. The diode DLL1 on the BSF module is associated with the DLL LED on SAB1 (position +AC135, see Figure 5.1, page 3/7) and the diode DLL2 on the module BSF is associated with the DLL lamp on SAB2 (position +AC141): (If only one SAB module is fitted, the LED DLL2 on the BSF module remains dark). The transmitter running lamp (SLL) on module SAB also comes on.

Operation of steady light switch RL lights the switch itself, the CLOSE and OPEN buttons as well as all LED's on the override and command units (ISI - LED's). If one of the ISI-LED's does not come on, press the reset button QUIT; if the LED is still dark but fault lamp F4 does not come on, the diode is faulty and the module should be exchanged. If F4 comes on and an LED on one ABB flashes, check the feedback signal from the associated high voltage device. All other LED's F1 to F6, S1-REMOTE, HR, LSF on the panel of the manual control module (FGB), as well as the indicators ELL1 to ELL16 on the serial coupling modules (SAB) of the central unit and the LED's STO on modules BSF and SAB remain dark.

● Second check:

After closing the MCB's FOR MOTORDRIVES, all the motor drives for the switching devices connected to the central unit can be checked, using the master override switch S1. In this condition, the motor drive of the switching device can be "inched" so that an incorrect direction of rotation can be immediately recognized and corrected.

- NOTE! It is essential to put the high voltage switching device manually into an intermediate position before carrying out a direction of movement test in S1 mode. If this is not done, the switching device may run into a "locked" condition and the switching off capacity of the motor circuit control relay may be exceeded! When the drive mechanism moves in the correct direction and the switch reaches the required end position, the command impulse is removed and the semaphore indicator is moved to the new position.

Finally all switching devices connected to the central unit can be checked in normal operation - local control. Additionally, all three interlocking conditions shown on the functional diagram for the feeder interlocking (Figure 23) can be compared with the intended switching operations. If the device to be switched is subject only to internal interlocking conditions and these are satisfied, the switching operation will be carried out. Since the feeder interlock units are not connected at this stage, attempted operation of an externally interlocked device will cause a fault indication.

- When all switching devices have been tested, and before starting to commission a feeder unit, all switching devices shall be returned to the OPEN position and the three-position switch S5 shall be set at the position LOCAL CONTROL.

Leave the central unit switched on.



## 7.2.2 Feeder unit

Commissioning of the feeder units is also carried out in specific steps and a specific sequence. Feeder units ① are commissioned in the sequence determined by their allocation to the central unit plug board, beginning with plug position -X811 to -X814 ②, -X821 to -X824 ③, -X831 to -X834 ④, through to -X881 to -X884 ⑤.

This sequence of feeder units is to be taken from the tables on the single-line diagram for the central unit (Figure 24).

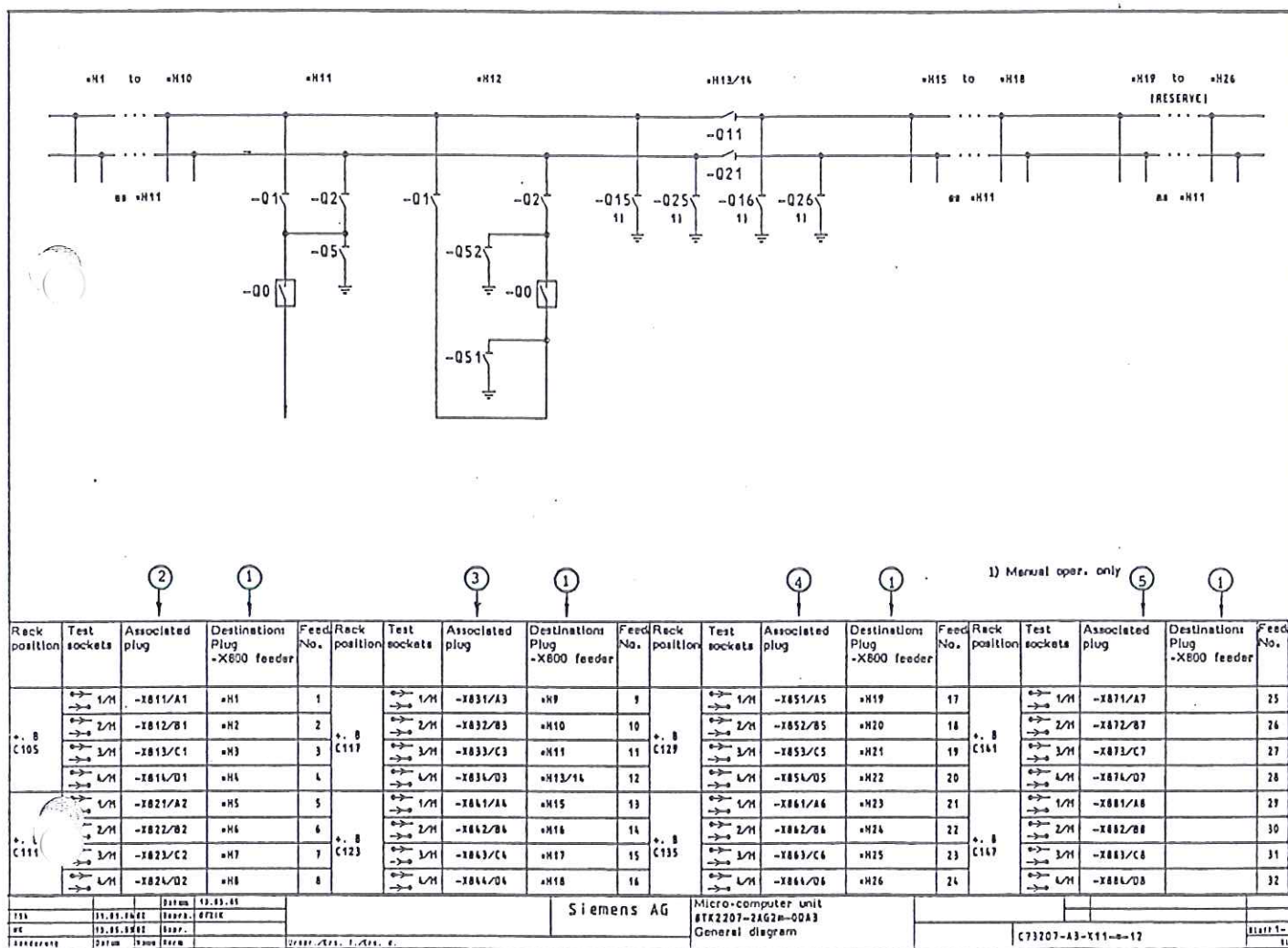


Fig 24 Allocation of the feeder unit plugs ① to the positions on the plug board of the central unit ② to ⑤.

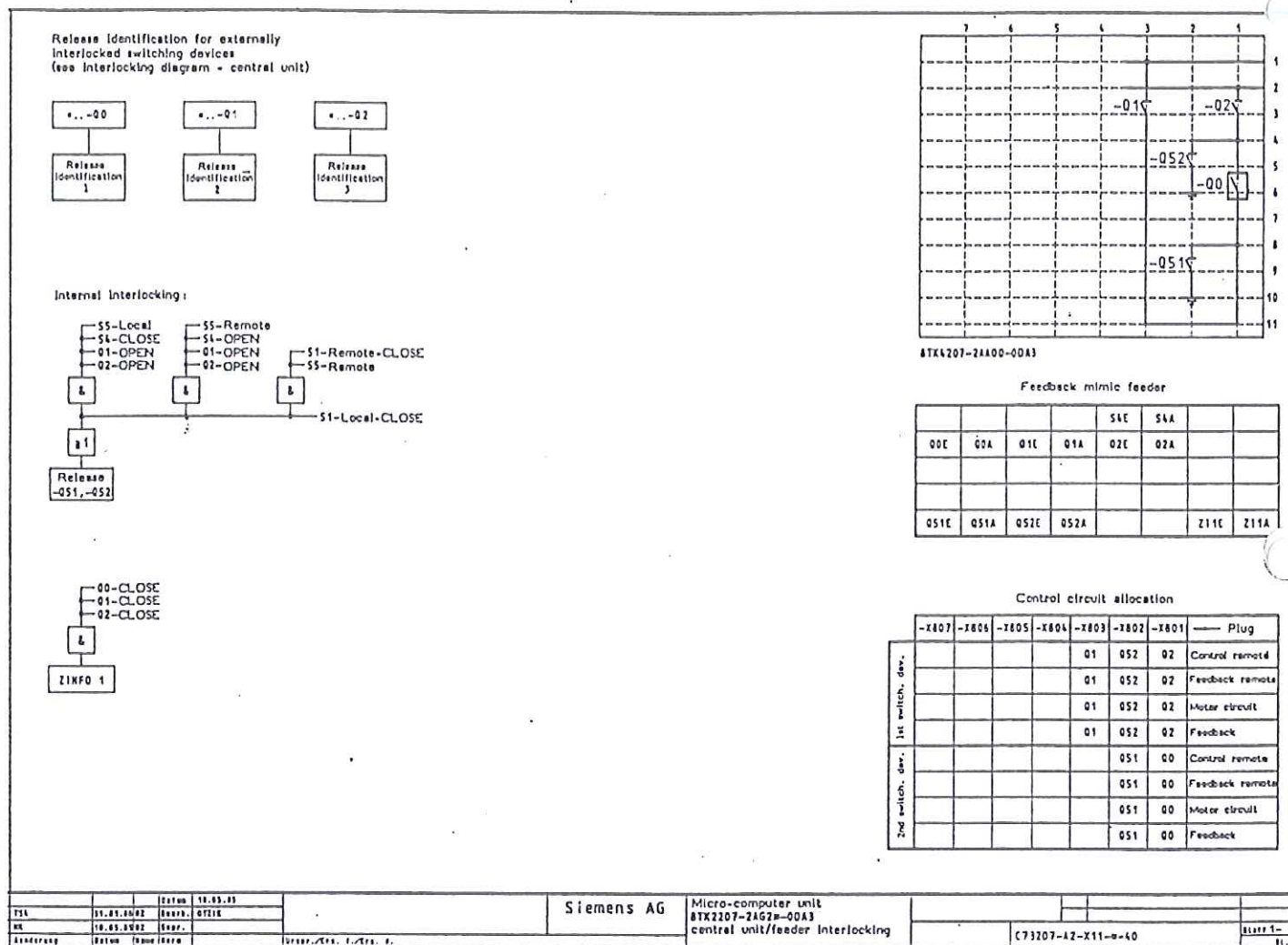


Fig 23 Functional diagram - internal interlocking for busbar coupler circuit, example for a central unit

- By closing the MCB FOR CONTROL AND FEEDBACK of the feeder (see diagram, Figure 12, page 5/12) the switching device positions as given by the auxiliary switches of the switching devices will be fed into the interlocking unit. The feeder unit power supply remains OFF.

- First check:

Semaphore indicators must correspond with the position of the switching devices (e.g. OPEN), otherwise the connections are reversed!

This is to be checked for all switching devices associated with the feeder unit.

- The power supply for the feeder unit is switched on next. The power supply unit operating lamps come on and the micro-computer stores the available data. Throughout this period (approx. 5 s) all the LED's (F1 to F6 red, M1 to M3 yellow) on the manual control module (FGB) come on.

The green LED's (ELL, SLL) on the micro-computer module signal the exchange of data with the central unit, the red indicator STO remains dark. Simultaneously with the appearance of the LED's ELL and SLL the associated receiver lamp (ELL...) on the receiver transmitter controlling module of the associated feeder, in the central unit, must come on.

On operation of the steady light switch RL, the switch itself is illuminated, CLOSE and OPEN button and all LED's on the interface and control modules (ISI-LED's) come on. If one of the ISI-LED's does not come on, press the reset button QUIT; if the LED still remains dark, without fault indicator F4 appearing, the LED is defective and the module must be exchanged. If F4 comes on and an LED on one ABB flashes, check the feedback signal from the associated high voltage device. All other LED's on the interface and control module of the feeder unit remain dark.

- Second check:

After closing the MCB's FOR MOTORDRIVES, all the motor drives for the switching devices connected to the central unit can be checked, using the master override switch S1. In this condition, the motor drive of the switching device can be "inched" so that an incorrect direction of rotation can be immediately recognized and corrected.

NOTE! It is essential to put the high voltage switching device manually into an intermediate position before carrying out a direction of movement test in S1 mode. If this is not done, the switching device may run into a "locked" condition and the switching off capacity of the motor circuit control relay may be exceeded! When the drive mechanism moves in the correct direction and the switch reaches the required end position, the command impulse is removed and the semaphore indicator is moved to the new position.

- Finally, all switching devices of the feeder which are internally interlocked can be operated normally by local control. Check that the receiver run lamp of the associated feeder on the receiver/transmitter module in the central unit, comes on. The relationship between the LED's and the feeder/plug connection points of the central unit plug board is as follows:



ELL1 of the receiver/transmitter controlling module 1 (8TK3 005-1AA00) is allocated to the plug -X811, ELL2/-X812 etc. to ELL16/-X844 and of the receiver/transmitter controlling module 2 (8TK3 005-2AA00) ELL1 to ELL16 are allocated in numerical sequence to the plugs -X851 to -X884.

If the LED's ELL and SLL of the feeder unit and the associated LED ELL... of the central unit come on, there is a healthy exchange of data between the two units. The switching devices in the feeder can now be operated under supervision of the interlocking conditions. As a check, the interlocking procedure can be compared with the intended switching operation.

If the device which is to be switched is subject only internal interlocking conditions and these are satisfied, the switching operation will be completed; otherwise the fault indication F3 (interlocking conditions not satisfied) appears. This applies similarly to those switching device which are subject to external (plant interlocking).

When all switching devices have been tested, and before commissioning the next feeder unit, all switching devices shall be returned to the OPEN position and the three-position switch S5 shall be set at the position LOCAL CONTROL.

Only when all feeder units have been commissioned in the described sequence, a complete plant interlock check for all switching devices can be made. If the interlocks are satisfied, the switching operations will be carried out; otherwise the fault indication F3 will appear. In case of any fault, the switchboard interlock conditions can be checked against the functional diagram (part of the central unit schematic, Figure 25) to know which interlocks should be fulfilled and to check against the associated feeder switching devices positions. Comparison of the switch positions CLOSE/OPEN with the interlock conditions.

#### CAUTION!

If a switching device cannot be operated, even though the interlocking conditions in accordance with the functional diagram are fulfilled, please contact the following address, giving the serial number of the device and the associated schematic diagram number:

Siemens AG  
Dept. E765  
Werner von Siemens Str. 50  
8520 Erlangen  
Germany

Telephone (National)  
09131/7-22821

Telephone (International)  
..49 9131 /-22821





With remote control the interlock units are 2-pole operated. If the steady lamp switch RL is not closed, an opening or closing movement will not be indicated. The completed operation is indicated by the semaphore indicator. If the selected operation is not permissible, fault indicator F3 appears; if the switching device does not respond to the command or remains in an intermediate position, fault indicator F4 and/or F6 will appear (see 9.2.2.2 "Interpretation of fault indications"). If the steady lamp switch is closed, the sequence is the same as with local control.

When controlling switching devices at the unit (local control), two hands must be used. When the steady light button RL is depressed the button itself is illuminated, the CLOSE and OPEN button as well as all ISI-LED's on the interface and command modules come on. The semaphore indicators show the existing position of all the switching devices and the absence of any intermediate position indication shows that all of the devices are in their correct end position. Under these conditions, selection of the required direction of movement CLOSE or OPEN and simultaneous operation, with the other hand, of the selected switching device button, will lead to the execution of a permissible switching command. Whilst the switching device is moving from its previous to its newly selected position, the lamp in the switching direction button (CLOSE or OPEN) goes out and the ISI-LED of the associated device, on the interface and control module (ABB) flashes. When the switching device reaches its selected end position the semaphore indicator moves to confirm this. ISI-LED stops flashing and the lamp in the switched direction button comes on again.

If the selected switching operation is not permissible, fault indicator F3 will appear; if the switching device does not respond or remains in an intermediate position, fault indication F4 and/or F6 will appear (see 9.2.2.2 "Interpretation of Fault Indications").

To minimize the constant power demand of the interlocking unit, switch off the steady light switch RL when no local control operation is being performed (Remote control).



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#### 7.2.1 Central unit

- On closing the PROTECTIVE SWITCHES (m.c.b) FOR CONTROL AND FEED-BACK (see diagram, Figure 12, page 5/12) the switching device positions are fed into the interlocking unit via their auxiliary switches. The power supply module on the central unit remains OFF!

- First check:

The semaphore indicator positions must agree with the actual position of the switching devices (e.g. OPEN) otherwise the connections must be interchanged!

This check must be carried out for all the switching devices which are connected to the central unit.

- Next, switch on the power supply for the central unit. The operating lamps of the power supply unit come on and the micro-computer stores the available data. Throughout this time (approx. 5 s) all the LED's on the manual control module (FGB) are on (F1 to F6 red, M1 to M3 yellow). Readiness for operation is indicated when the LED's on FGB go out and all the green LED's (DLL) on the processing unit and the serial coupling module come on. The diode DLL1 on the BSF module is associated with the DLL LED on SAB1 (position +AC135, see Figure 5.1, page 3/7) and the diode DLL2 on the module BSF is associated with the DLL lamp on SAB2 (position +AC141): (If only one SAB module is fitted, the LED DLL2 on the BSF module remains dark). The transmitter running lamp (SLL) on module SAB also comes on.

Operation of steady light switch RL lights the switch itself, the CLOSE and OPEN buttons as well as all LED's on the override and command units (ISI - LED's). If one of the ISI-LED's does not come on, press the reset button QUIT; if the LED is still dark but fault lamp F4 does not come on, the diode is faulty and the module should be exchanged. If F4 comes on and an LED on one ABB flashes, check the feedback signal from the associated high voltage device. All other LED's F1 to F6, S1-REMOTE, HR, LSF on the panel of the manual control module (FGB), as well as the indicators ELL1 to ELL16 on the serial coupling modules (SAB) of the central unit and the LED's STO on modules BSF and SAB remain dark.

● Second check:

After closing the MCB's FOR MOTORDRIVES, all the motor drives for the switching devices connected to the central unit can be checked, using the master override switch S1. In this condition, the motor drive of the switching device can be "inched" so that an incorrect direction of rotation can be immediately recognized and corrected.

- NOTE! It is essential to put the high voltage switching device manually into an intermediate position before carrying out a direction of movement test in S1 mode. If this is not done, the switching device may run into a "locked" condition and the switching off capacity of the motor circuit control relay may be exceeded! When the drive mechanism moves in the correct direction and the switch reaches the required end position, the command impulse is removed and the semaphore indicator is moved to the new position.

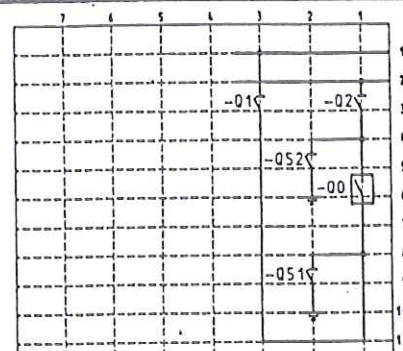
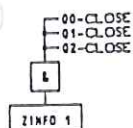
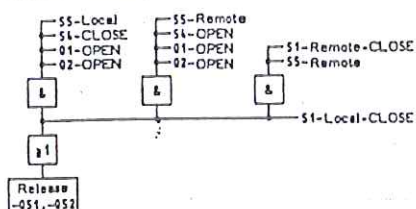
Finally all switching devices connected to the central unit can be checked in normal operation - local control. Additionally, all three interlocking conditions shown on the functional diagram for the feeder interlocking (Figure 23) can be compared with the intended switching operations. If the device to be switched is subject only to internal interlocking conditions and these are satisfied, the switching operation will be carried out. Since the feeder interlock units are not connected at this stage, attempted operation of an externally interlocked device will cause a fault indication.

- When all switching devices have been tested, and before starting to commission a feeder unit, all switching devices shall be returned to the OPEN position and the three-position switch S5 shall be set at the position LOCAL CONTROL.

Leave the central unit switched on.



The diagram shows three separate boxes, each representing a release identification. The first box is labeled 'x...-00' and contains 'Release Identification 1'. The second box is labeled 'x...-01' and contains 'Release Identification 2'. The third box is labeled 'x...-02' and contains 'Release Identification 3'.



### Feedback mimic feeder

				S4E	S4A		
Q0E	Q0A	Q1E	Q1A	Q2E	Q2A		
Q51E	Q51A	Q52E	Q52A			Z11E	Z11A

	-X801	-X804	-X805	-X804	-X803	-X802	-X801	Plug
1st switch, dw.					01	052	02	Control remote
					01	052	02	Feedback remote
					01	052	02	Motor circuit
					01	052	02	Feedback
2nd switch, dw.						051	00	Control remote
						051	00	Feedback remote
						051	00	Motor circuit
						051	00	Feedback

[illegible]

Fig 23 Functional diagram - internal interlocking for busbar coupler circuit, example for a central unit

## 7.2.2 Feeder unit

Commissioning of the feeder units is also carried out in specific steps and a specific sequence. Feeder units ① are commissioned in the sequence determined by their allocation to the central unit plug board, beginning with plug position -X811 to -X814 ②, -X821 to -X824 ③, -X831 to -X834 ④, through to -X881 to -X884 ⑤.

This sequence of feeder units is to be taken from the tables on the single-line diagram for the central unit (Figure 24).

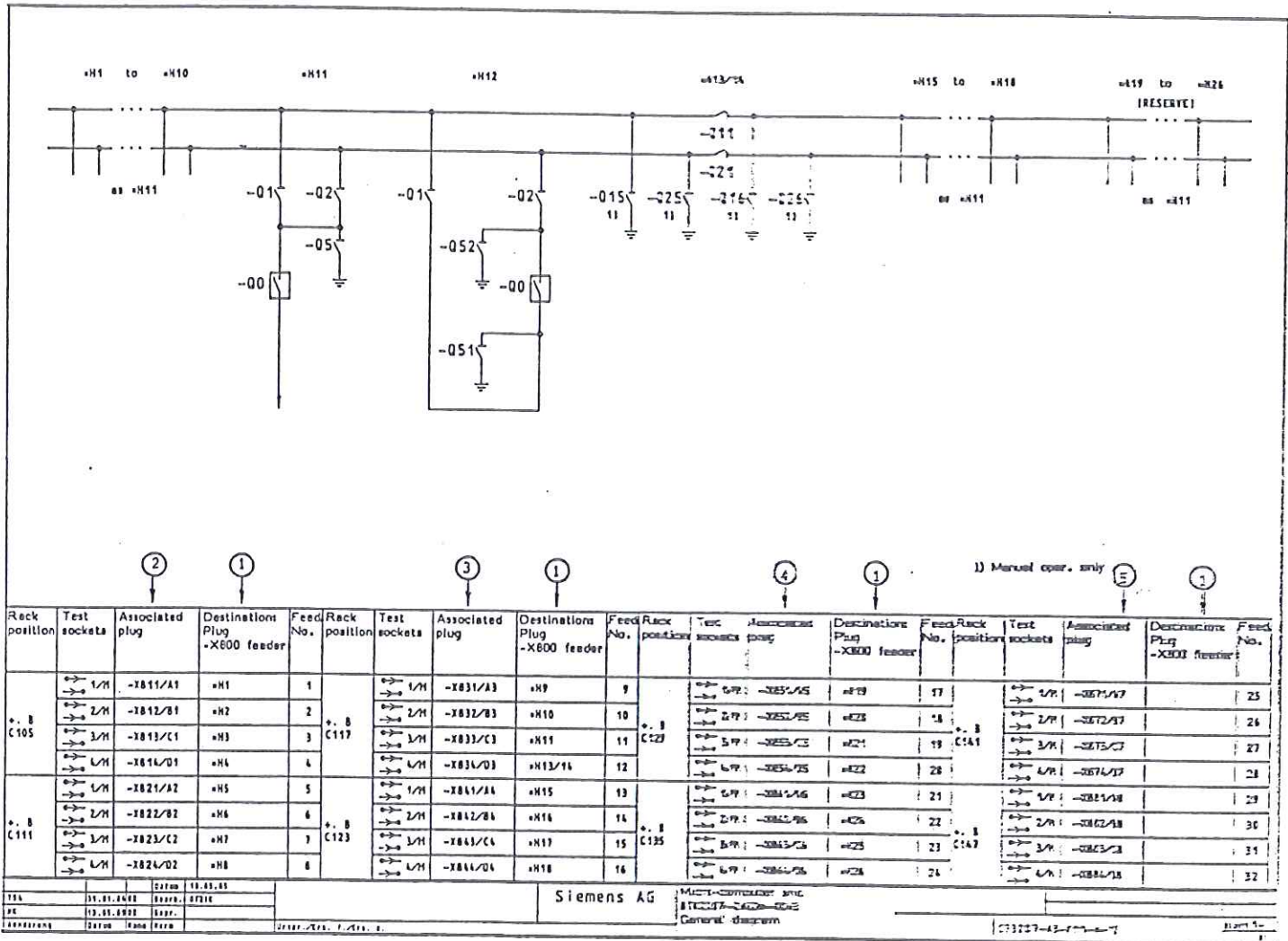


Fig 24 Allocation of the feeder unit plugs ① to the positions on the plug board of the central unit ② to ⑤.



- By closing the MCB FOR CONTROL AND FEEDBACK of the feeder (see diagram, Figure 12, page 5/12) the switching device positions as given by the auxiliary switches of the switching devices will be fed into the interlocking unit. The feeder unit power supply remains OFF.

- First check:

Semaphore indicators must correspond with the position of the switching devices (e.g. OPEN), otherwise the connections are reversed!

This is to be checked for all switching devices associated with the feeder unit.

- The power supply for the feeder unit is switched on next. The power supply unit operating lamps come on and the micro-computer stores the available data. Throughout this period (approx. 5 s) all the LED's (F1 to F6 red, M1 to M3 yellow) on the manual control module (FGB) come on.

The green LED's (ELL, SLL) on the micro-computer module signal the exchange of data with the central unit, the red indicator STO remains dark. Simultaneously with the appearance of the LED's ELL and SLL the associated receiver lamp (ELL...) on the receiver transmitter controlling module of the associated feeder, in the central unit, must come on.

On operation of the steady light switch RL, the switch itself is illuminated, CLOSE and OPEN button and all LED's on the interface and control modules (ISI-LED's) come on. If one of the ISI-LED's does not come on, press the reset button QUIT; if the LED still remains dark, without fault indicator F4 appearing, the LED is defective and the module must be exchanged. If F4 comes on and an LED on one ABB flashes, check the feedback signal from the associated high voltage device. All other LED's on the interface and control module of the feeder unit remain dark.

- Second check:

After closing the MCB's FOR MOTORDRIVES, all the motor drives for the switching devices connected to the central unit can be checked, using the master override switch S1. In this condition, the motor drive of the switching device can be "inched" so that an incorrect direction of rotation can be immediately recognized and corrected.

NOTE! It is essential to put the high voltage switching device manually into an intermediate position before carrying out a direction of movement test in S1 mode. If this is not done, the switching device may run into a "locked" condition and the switching off capacity of the motor circuit control relay may be exceeded! When the drive mechanism moves in the correct direction and the switch reaches the required end position, the command impulse is removed and the semaphore indicator is moved to the new position.

- Finally, all switching devices of the feeder which are internally interlocked can be operated normally by local control. Check that the receiver run lamp of the associated feeder on the receiver/transmitter module in the central unit, comes on. The relationship between the LED's and the feeder/plug connection points of the central unit plug board is as follows:

ELL1 of the receiver/transmitter controlling module 1 (8TK3 005-1AA00) is allocated to the plug -X811, ELL2/-X812 etc. to ELL16/-X844 and of the receiver/transmitter controlling module 2 (8TK3 005-2AA00) ELL1 to ELL16 are allocated in numerical sequence to the plugs -X851 to -X884.

If the LED's ELL and SLL of the feeder unit and the associated LED ELL... of the central unit come on, there is a healthy exchange of data between the two units. The switching devices in the feeder can now be operated under supervision of the interlocking conditions. As a check, the interlocking procedure can be compared with the intended switching operation.

If the device which is to be switched is subject only internal interlocking conditions and these are satisfied, the switching operation will be completed; otherwise the fault indication F3 (interlocking conditions not satisfied) appears. This applies similarly to those switching device which are subject to external (plant interlocking).

When all switching devices have been tested, and before commissioning the next feeder unit, all switching devices shall be returned to the OPEN position and the three-position switch S5 shall be set at the position LOCAL CONTROL.

Only when all feeder units have been commissioned in the described sequence, a complete plant interlock check for all switching devices can be made. If the interlocks are satisfied, the switching operations will be carried out; otherwise the fault indication F3 will appear. In case of any fault, the switchboard interlock conditions can be checked against the functional diagram (part of the central unit schematic, Figure 25) to know which interlocks should be fulfilled and to check against the associated feeder switching devices positions. Comparison of the switch positions CLOSE/OPEN with the interlock conditions.

#### CAUTION!

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Siemens AG  
Dept. E765  
Werner von Siemens Str. 50  
8520 Erlangen  
Germany

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Telephone (International)  
..49 9131 /-22821





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When controlling switching devices at the unit (local control), two hands must be used. When the steady light button RL is depressed the button itself is illuminated, the CLOSE and OPEN button as well as all ISI-LED's on the interface and command modules come on. The semaphore indicators show the existing position of all the switching devices and the absence of any intermediate position indication shows that all of the devices are in their correct end position. Under these conditions, selection of the required direction of movement CLOSE or OPEN and simultaneous operation, with the other hand, of the selected switching device button, will lead to the execution of a permissible switching command. Whilst the switching device is moving from its previous to its newly selected position, the lamp in the switching direction button (CLOSE or OPEN) goes out and the ISI-LED of the associated device, on the interface and control module (ABB) flashes. When the switching device reaches its selected end position the semaphore indicator moves to confirm this. ISI-LED stops flashing and the lamp in the switched direction button comes on again.

If the selected switching operation is not permissible, fault indicator F3 will appear; if the switching device does not respond or remains in an intermediate position, fault indication F4 and/or F6 will appear (see 9.2.2.2 "Interpretation of Fault Indications").

To minimize the constant power demand of the interlocking unit, switch off the steady light switch RL when no local control operation is being performed (Remote control).