

Advant Controller 31
Intelligent Decentralized
Automation System

Example program for 907 AC 1131
Series 90 RCOM programming

Dial lines

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1 Modem settings

1.1 General

Coupler settings for the example programs "Wahlmaster_s90" and "Wahlslave_s90" used with 907 AC 1131.

Basic condition: The modems MUST BE ABLE to operate in direct mode!!

Tip: It's of prime importance to have numerous PCs available to be able to control the data traffic via the CONSOLE interface of the 07KP90 coupler. For this purpose, terminal programs (e.g. Hyper Terminal) can be used. The CONSOLE interface setting is always 9600,8,1,N.

The RCOM transmission can be performed with baud rates between 300 and 9600 baud.

1.2 Presetting the dial modems: ELSA Microlink 14.4TQ

Presetting is performed via a direct connection between the PC and the modem using the supplied modem cable (1:1 wiring without any changes because in principle modems are only extension cables!).

Modem 9-pole male	<i>Adapter</i>	PC, 9-pole female
DCD 1	_____ 1	CD
RxD 2	_____ 2	RxD
TxD 3	_____ 3	TxD
DTR 4	_____ 4	DTR
SGND 5	_____ 5	SGND
DSR 6	_____ 6	DSR
RTS 7	_____ 7	RTS
CTS 8	_____ 8	CTS
RI 9	_____ 9	

AT&F Loading the standard configuration.
ATX0 Only the result code <CONNECT> is output. The dial/busy tone is ignored.
ATE1 Commands are echoed by the modem.
ATN1 Setting the modem to direct mode. Caution: Not all modems are able to operate in this mode!!
AT&W Non-volatile storage of the extended configuration profile.

This could also be performed via the coupler SETUP, e.g.

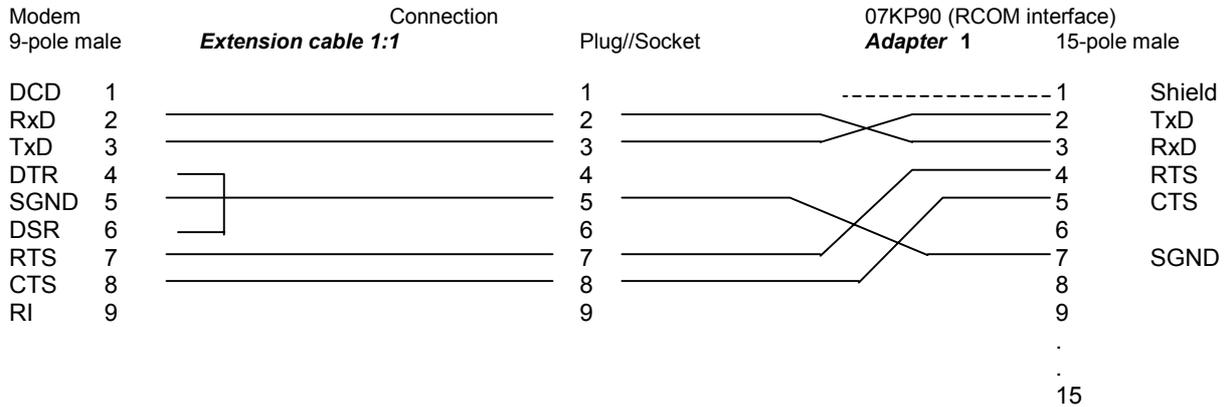
```
OPERATOR> show setup
0: MODEM_INIT      AT&F^M~~ATZ^M~~ATX0^M~~ATE1^M~~AT\N1^M~~
1: DIAL_PREFIX_1  ATDT
2: DIAL_PREFIX_2  ATDP
etc.
```

However, not all couplers are able to respond to the modem feedback correctly or to output the strings correctly. This is why a fixed presetting as shown here is recommended.

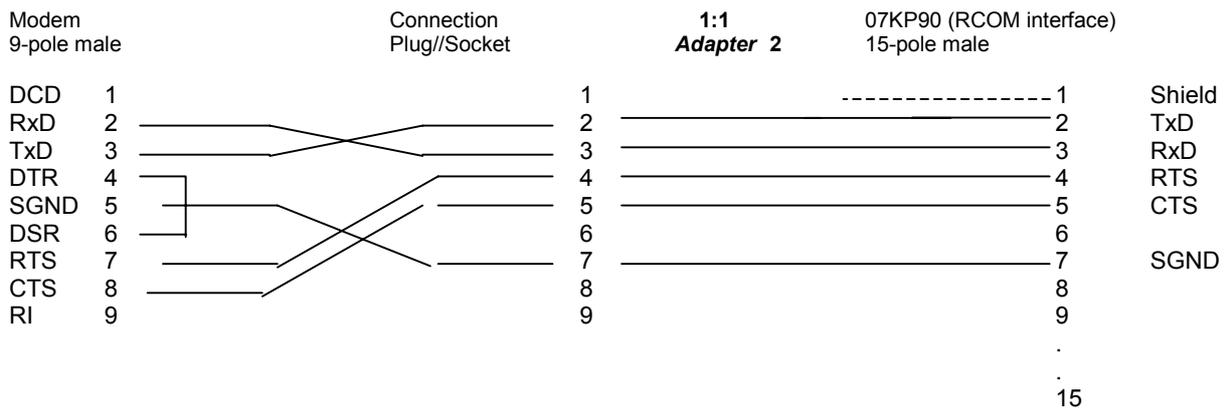
1.3 Connecting the modems to the RCOM interface of the 07KP90

This is performed via a direct connection between the 07KP90 and the modem using the following modem cable (1:1 wiring without any changes because in principle modems are only extension cables!).

Connection between the MODEM and the KP90 RCOM interface (for data remote transfer).
Modem cables are always wired 1:1 because in principle they are only extension cables.
Thus: RD-RD/TD-TD/RTS-RTS/CTS-CTS



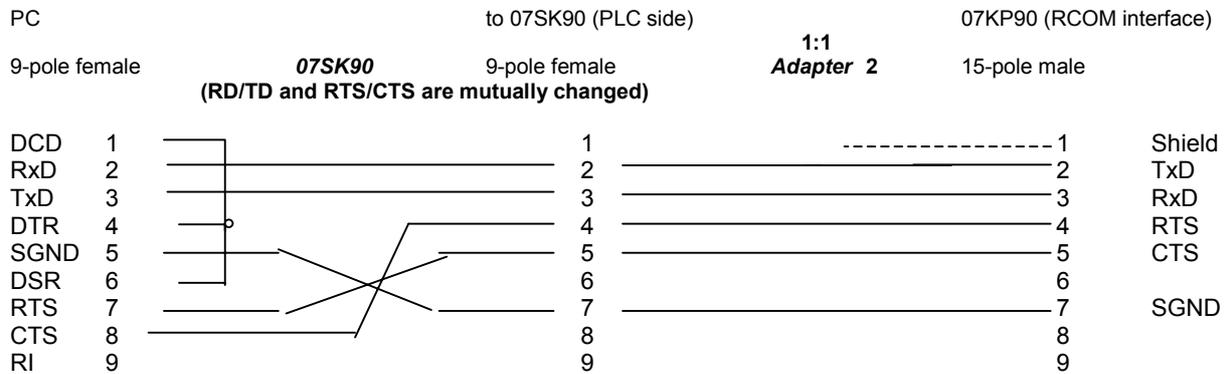
Also possible:



1.4 Connecting the terminal PC to the CONSOLE interface of the 07KP90

Adapter between 07SK90 (CS31 programming cable to the PC) and the KP90 console interface (viewing the parameters and the data traffic with the PC). Communication is always performed with 9600 bd!

RD/TD and RTS/CTS are mutually changed!



1.5 Parameterization of the coupler

Couplers are able to execute commands, if a corresponding command is entered after the "OPERATOR>" prompt. For example, the "HELP" command lists all other available commands.

```
OPERATOR> help
available commands:
  help.....this text
  time.....show RCOM's system time
  event.....show event-queue
  rcom.....show RCOM parameters           Data at RCOM CE
  rcsw.....show RCOM status word
  show setup.....show setup-file
  show phone.....show telephone directory
  phone <slave>.....modify telephone directory
  setup <entry>.....modify setup entries
  save.....save setup/phone
  default.....create default setup/phone
  hangup.....hangup phone
  dial <slave>.....dial a slave
  mod <command>.....send a command to modem
  debug <level>.....show/set debug level
```

1.5.1 Setup for the MASTER

```
OPERATOR> show setup
 0: MODEM_INIT      ATZ^M~~      Set modem to default values
 1: DIAL_PREFIX_1   ATDT          Tone dialing
 2: DIAL_PREFIX_2   ATDP          Pulse dialing
 3: DIAL_PREFIX_3   not used
 4: DIAL_PREFIX_4   not used
 5: DIAL_PREFIX_5   not used
 6: DIAL_PREFIX_6   not used
 7: DIAL_SUFFIX     ^M          CR (carriage return), after the number
 8: CONNECT_ANS     CONNECT      Modem response if connection established
 9: MODEM_RING      RING        Modem response if call detected
10: NO_CARRIER     NO CARRIER  Modem response if line OFF
11: COMMAND         ~~~+++~~~    Switch modem to command mode
12: MODEM_ANSWER    ATA^M        Modem response if "handset off the hook"
13: MODEM_HANGUP    ATH^M        Modem response if "handset on the hook"
14: MAX_RING_TIME   70          Time (sec.) the KP90 waits for
                                connection
15: MAX_NO_CALLS    3           max. number of bids (starting from dial)
                                before error
16: CALL_DELAY      7           Time (sec.) between two bids
17: HANGUP_TIME     30          Time (sec.) until hang up at silence
condition
```

1.5.2 Setup for slave 1

```
OPERATOR> show setup
 0: MODEM_INIT      ATZ^M~~
 1: DIAL_PREFIX_1   ATDT
 2: DIAL_PREFIX_2   ATDP
 3: DIAL_PREFIX_3   not used
 4: DIAL_PREFIX_4   not used
 5: DIAL_PREFIX_5   not used
 6: DIAL_PREFIX_6   not used
 7: DIAL_SUFFIX     ^M
 8: CONNECT_ANS     CONNECT
 9: MODEM_RING      RING
10: NO_CARRIER     NO CARRIER
11: COMMAND         ~~~+++~~~
12: MODEM_ANSWER    ATA^M
13: MODEM_HANGUP    ATH^M
14: MAX_RING_TIME   70
15: MAX_NO_CALLS    3
16: CALL_DELAY      7
17: HANGUP_TIME     5
```

1.5.3 Defining the setup parameters

Unfortunately always the entire line has to be entered in the line editor, e.g.
MODEM_INIT.....ATZ^M~~<CR>

```
OPERATOR> setup
                6 blank characters!
                .....
setup  0: MODEM_INIT      ATZ^M~~
setup  0>

setup  1: DIAL_PREFIX_1  ATDT
setup  1>

setup  2: DIAL_PREFIX_2  ATDP
setup  2>
```

1.5.4 Viewing the telephone directory

```
OPERATOR> show phone
0: 1 2153      Master
1: 1 2102      Slavel

* -----      consecutive number, node at DIAL, master always 0
* -----      Prefix output when calling (according to the setup,
                ATDT is prefix 1; ATDP is prefix 2 - actually only
                prefix 1 is left). Therefore here e.g.: ATDT2102
```

1.5.5 Creating a telephone directory (identical for master and slave x)

Inside of PBX installations almost every time a 0 has to be predialed,
therefore:

```
0W03091772102
```

In our example we are using internal phone numbers.

```
OPERATOR> phone
phone  0: 1 2153      Master
phone  0> 1 2153      Master

phone  1: 1 2102      Slavel
phone  1>

* -----      consecutive number, node at DIAL, master always 0
* -----      Prefix output when calling (according to the setup,
                ATDT is prefix 1; ATDP is prefix 2 - actually only
                prefix 1 is left). Therefore here e.g.: ATDT2102
```

Never forget to SAVE. Otherwise everything will be lost.

```
OPERATOR> save
programming eeprom, please wait...
programming done.
OPERATOR>
```

1.5.6 Viewing the RCOM CE settings in the coupler

```
OPERATOR> rcom
RCOM parameters:
    net:          0          always 0
    address:      1          0=Master, 1=slave1, 2=slave2 ...etc....
    bitrate:     19200
    parity:       0
    duplex:       1
line st. time:   3
carrier delay:   2
char. timeout:   52
turnaround t.:  6000
retransmiss. :   3
  max no. poll:  20
type of modem:   1
  preambles:     3
  plc timeout:   2000
    rcom typ:    1          0=RCOM; 1=RCOM+
    digi time:   0
```

1.6 General hints

Using the command prefix "MOD" you can enter direct modem commands via the console interface. E.g. a direct command such as "ATDT 0W91772102" has to be entered as follows:
MOD ATDT 0W91772102

Otherwise the available commands which are listed using "HELP" can be executed, e.g.
OPERATOR>DIAL 1 ; dials slave 1

The debug level can also be changed. However, this influences the system time because only one processor is available.

```
OPERATOR> debug 0      no output
OPERATOR> debug 1      only the most important information are output
OPERATOR> debug 2      all information are output
```

The normal setting is "debug 1". "Debug 2" should only be used for the IBN because this extends the system time of the coupler.

2 Example programs

2.1 RCOM master (Wählmaster_s90.pro)

The following libraries are used:

RCOM_s90_v41.lib; BASE_s90_v41.lib and IEC_s90_v41.lib

The test was performed using two 07KT97 devices and corresponding RCOM couplers 07KP90.

2.1.1 Communication to the slave

Dialing (DIAL) is started with a 0-1 edge at input E62,00 of the PLC. If no connection can be established, DIAL is first repeated as often as specified at RCOM CE (Retr = retransmission). Then a wait time of 70 seconds is processed. After the wait time has elapsed, dialing is repeated. After the connection is established successfully, COLDST, WARMST and NORMAL follow one after the other.

After a successful NORMALization, TRANSM is performed during which the data record IDT1 (MW1010,00...15) is sent to the RECV of the slave where it is stored under the same addresses.

Following to the successful TRANSM, READ is performed during which the data record IDT3 (MW1020,00...15) is read from READ_S of the slave and stored under the same addresses.

After a successful READ, POLL is carried out.

In our example, during POLL the data record IDT3 (MW1020,00...15) is likewise received at RECV of the master and stored under these addresses, refer to section "Communication from the slave". The reason for this is that the slave is using TRANSM to write its events to the queue. The counterpart of TRANSM on the master's side is RECV which, however, must be polled because the slave cannot apply TRANSM directly to the master. The CE is only required if the slave is called by the master, not vice versa!

After POLL is performed successfully, the chain jumps back to TRANSM and the data exchange begins anew. To interrupt the continuous transmission, a 0-1 edge must be applied to input E62,01 of the PLC. This will leave the loop after POLL and then execute HANGUP. After a successful HANGUP, a wait time of 40 seconds is applied before the chain goes into the idle state waiting for a new start (0-1 edge at E62,00).

If one of the blocks COLDST, WARMST, NORMAL, TRANSM, READ or POLL fails, HANGUP is performed followed by a wait time of 70 sec. After the wait time has elapsed, DIAL is performed once again.

2.1.2 Visual indication

A62,00 during DIAL

A62,01 during COLDST

A62,02 during WARMST

A62,03 during NORMAL

A62,04 during TRANSM

A62,05 during READ

A62,06 during POLL

A62,07 during HANGUP

A62,08 - flashes with 4 Hz during wait time after HANGUP until "ready for start" is reached again (40 s)

- flashes with 1 Hz during wait time after error until DIAL is performed once again (70 s)

2.1.3 Data transmission

In the example the data TO THE SLAVE (IDT1 – MW1010,00...15) are mirrored by the slave with an offset of 10 to IDT3 and then returned to the master. This way the data traffic in the master can be viewed easier.

2.2 RCOM slave (Wählslave_s90.pro)

The following libraries are used:

RCOM_s90_v41.lib; BASE_s90_v41.lib and IEC_s90_v41.lib

The test was performed using two 07KT97 devices and corresponding RCOM couplers 07KP90.

2.2.1 Communication to the master

The slave (here: node1) processes the function blocks RECV (data reception from master TRANSM) and READ_S (making data available for the master READ) without any further enabling.

These functions are passive and always performed by the master after a connection is established.

If the slave has to call the master the procedure is quite different.

In this case the slave can write a maximum of 20 data records by each TRANSM into its event queue:
1 data record = 14 MW + 2 MW time stamp.

This is performed by a 0-1 edge at input E62,00.

As soon as input E62,01 is set to 1, the slave calls the master (DIAL).

As a result the master tries to normalize all slaves (automatically, no CE necessary).

Because the caller is the only one who is able to respond, only the caller is normalized.

After this, the master automatically polls the detected slave (no POLL CE necessary) until the slave indicates that its event queue is empty or until the maximum number of polls specified with the parameter MaxP is reached.

The polled data records are transmitted to the RECV (belonging to the individual TRANSM) of the master (same IDT number). (In the example only one TRANSM per RECV.)

Then the master hangs up automatically (no HANGUP CE necessary). The slave likewise hangs up after its "hangup time".

In case of an error (after DIAL) the slave waits for 2 minutes and then repeats the DIAL process.

2.2.2 Visual indication

A62,00 during DIAL

A62,01 after successful DIAL and prior to HANGUP (approx. 10 s)

A62,02 after failed DIAL (approx. 2 min)

A62,10 if the master is calling (approx. 1 min)

A62,11 flashes with 4 Hz as long as an event is waiting in the queue

2.2.3 Data transmission

In the example the data FROM THE MASTER (IDT1 – MW1010,00...15) are mirrored by the slave with an offset of 10 to IDT3 and then returned to the master. This way the data traffic in the master can be viewed easier.