RS232 COMMUNICATIONS ('C') OPTION

This version of Microstart is fitted with an RS232C interface, enabling it to communicate with a remote 'control centre' via a suitable pair of modems and the public switched telephone network (PSTN).

With such a set-up, a remote operator - either end-user, generator manufacturer or service engineer - may interrogate Microstart about the current status of the generator and control the starting, stopping and load transfer of the set. Such Microstarts can also be programmed to automatically dial up a remote control centre and leave an appropriate message whenever a generator fault is registered.

FAMILIARISATION

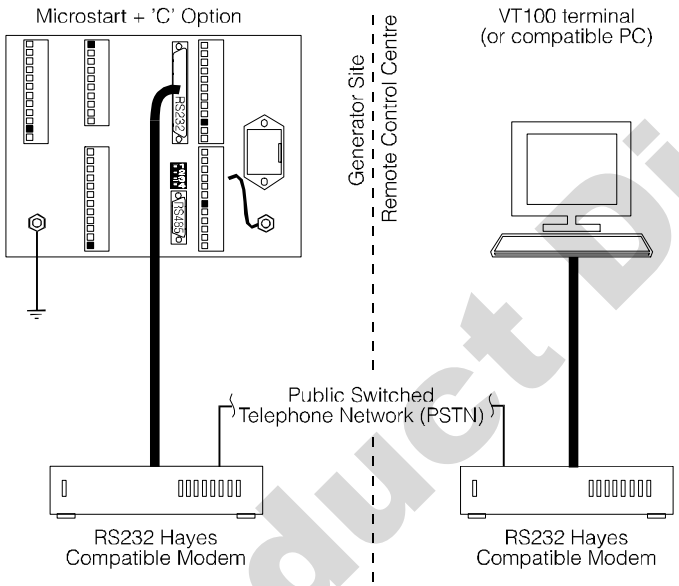
Microstarts with a communications facility are identified by a 'C' in the part number, e.g. MS1AC. (The part number may be found on the yellow connection label on the top side of each unit.)

The units are characterised by two 'D' type terminals at the rear: the upper, 25 way connector is the RS232C interface. *(N.B. The lower, 9 way connector is intended as an output for a future RS485 interface. As of March 1995, the protocol and software for this has yet to be finalised, and no attempt should therefore be made to connect to this port, nor to tamper with the bank of 4 DIL switches located close by).*

Apart from the connection of the RS232 port, the installation and connection of a 'C' option Microstart is the same as any standard unit. Communications type units *do* however require an extra two 'program mode' function groups to be set up (see 'programming' below).

CONNECTING UP

The overall connection schematic for the communications circuit is as follows:



Both modems must be of a Hayes compatible type. The Microstart modem should ideally incorporate either a battery backed-up or DC power supply, allowing communication to take place during a mains or generator failure.

The remote 'terminal' should comprise a minimum of a DEC VT100 compatible terminal - usually with a printer echo - or a device capable of emulating VT100, e.g. an IBM compatible PC with suitable software.

Connection at the generator site...

Before any connection is made, ensure that both Microstart and its modem are powered down. Using a fully screened, Hayes compatible connection lead (e.g. RS202-739), make a direct connection between the 25 way (male) connector at the rear of Microstart and the 25 way (female) connector on the modem. Each connector should be located, then secured in position using the two fixing screws.

Connect the modem's PSTN and power supply connections in accordance with the manufacturer's instructions, then power up the units in the following order: modem first, Microstart second.

At the control centre...

With modem and terminal powered down, make a similar, direct connection between the modem's 25 way female connector and the serial communications port on the terminal/PC.

A screened, Hayes compatible lead should again be used, but the type of lead will depend on the type of 'D' connector on the terminal/PC. This is normally either a 25 way or 9 way connector: for 25 way types, use a similar lead to that employed at the generator modem; for 9 way types, a slightly different lead should be used (e.g. RS 202-745). Each end of the lead should again be connected, then secured using the two screw fixings.

Make the power supply and PSTN connections to the modem, then power up the units - modem first, terminal second.

PROGRAMMING

The standard version of Microstart has five groups of programmable functions:

'event inputs'
'charge fail'
'timers'
'system values'
'switches'.

The 'C' option Microstart has the same five groups (which are programmed as normal), plus 2 extra groups: 'Set Date & Time?' and 'Set communications?'. The option to enter and re-program these groups is given after programming the 'set switches' group:

Setting Date and Time:

Set Date & Time ? No: ↓ Yes: ↵	Press [↵] to re-program date and time.
Mon 16th Jan 1995 Change: ←↑↓→ Done: ↵	Use [←] or [→] to select in turn the date, month and year fields (as indicated by the underlining cursor) and [↑] or [↓] to alter each one. (Note that the 'day' field changes automatically as the others are set). When the correct date is displayed, press [↵] to enter.
Time: 14:57:33 Change: ←↑↓→ Done: ↵	Use [←] or [→] to select in turn the hours, minutes or seconds segments (as indicated by the underlining cursor) and [↑] or [↓] to set the value of each. (Note that 'hours' segment is in 24 hour format.) When the correct time is displayed, press [↵] to enter.

Setting Communications Functions:

Set communications? No: ↓ Yes: ↵	Press [↵] to set up communications.
"Installation Name" Change: ←↑↓→ Done: ↵	This screen requires the entry of an 'installation name' (of up to 20 characters). When communication is initiated, this name is displayed on the remote terminal: the name/number must therefore be unique to that generator. Use [←] or [→] to select each character in turn (indicated by the underlining cursor) and [↑] or [↓] to change each one. When the

correct name is displayed, press ↵ to enter it into memory.

Log-on Password:
MODEX ←↑↓→ ↵

Once a communications link has been established, the remote operator is asked to enter this 5 character password (to inhibit access by unauthorised personnel). The password may be unique to that generator, or a common word used to access all such Microstarts. The default password is 'MODEX', but this may be changed by using the cursor keys as for 'installation name' above.

Phone out condition
Alarm or alert ↑↓ ↵

This specifies the circumstances under which Microstart will automatically dial up the remote control centre. The three options are:-

- During both 'Alarm or Alert' faults
- During 'Alarm (faults) Only'
- 'None' (i.e. never)

Use ↑ or ↓, to select the required option, then press ↵.

Enter phone no.
01705 637193 ←↑↓→ ↵

This specifies the phone number of the remote control centre to be dialled. Use ← or → to select each digit in turn, and ↑ or ↓ to select the number for each - this will normally be 0 to 9, but a space may also be used in the displayed number without adverse effect; if a 3 second pause is required between the dialling of digits, use the ',' (comma) symbol. When the correct number is displayed, press ↵ to enter.

Once these and all the other programmable functions have been correctly set, the procedure for exiting program mode and saving changes is as for any standard unit.

OPERATION

General

While no communication is taking place between Microstart and the remote control centre, Microstart operates as normal.

A communication link can only be initiated if Microstart's key is switched to AUTO. Once a link is made, any operator local to Microstart should notice that both amber and green LEDs around Microstart's keyswitch flash simultaneously, indicating that the Microstart is under the control of a remote operator. The local operator can, however, re-establish control of the generator at any time by turning Microstart's key to ✋ (i.e. manual mode - the operator should then note that only the amber LED is continuously lit). Turning to manual mode results in the termination of all remote communication. Communication is similarly inhibited while the key is set to O (off/reset).

If communications have been established, and a correct password entered, the remote operator is able to control and interrogate Microstart by the use of 8 commands. The way in which these commands are sent from remote operator to Microstart depends on the type and sophistication of the remote terminal and its software. This may range from a 'dumb' VT100 terminal with printer echo at the most basic level, up to an integrated plant management system with software which has been custom designed to interrogate and manage information from several different plant sources (including Microstart). Before commands can be sent, reference will therefore need to be made to each terminal/software manufacturer's literature.

For the purposes of simplicity, the examples of command messages in this document are based on a simple VT100 system, showing the commands at their basic level of ASCII text strings.

Initiating communications from Control Centre to Microstart

To initiate a link with Microstart, the remote terminal needs to send a Hayes compatible 'dial' command to its Modem. For a VT100 terminal, this typically means the operator typing in a command after the prompt (>) symbol, e.g...

>ATDP01705637193 *(In this example, 'AT' signifies a Hayes command, 'D' signifies that the command is 'dial', 'P' signifies 'pulse-dialling'; '01705637193' is the number of the remote generator's modem. Reference will need to be made to the terminal literature for a full list of commands.)*

...followed by pressing the 'enter' (↵) key.

The terminal Modem then dials Microstart's modem. While the link is being established, the terminal's screen will typically display the following sequence of messages:

```
ATDP01705637193      <- Hayes 'dial' command and Microstart's phone number
CARRIER 300          <- Carrier wave established
CONNECT 1200         <- Communication established between modems, Baud rate 1200
Microstart Ver 0.7   <- Microstart in communication and
----- On-line -----     ready to accept commands on entry
Enter Password:-       of correct password
>
```

In order to establish remote control over Microstart, the operator must type in the correct 5 character password, matching the password already entered into that particular unit when its 'communications' function group was programmed.

If the incorrect password is entered , Microstart does not permit further access. (Note that an indefinite number of re-attempts may be made to enter the correct password?). When the correct password is sent, Microstart responds with the following 'plant status' message:

```
MODEX UK             <- Site name
Mon 6th Feb 1995     <- Current date and time
Time: 18:59:10
----------------------
AUTO: Mains healthy  <- Microstart's current operating mode and status
----------------------
Mains: Freq 50.0 Hz  <- Mains frequency
r230V y230V b230V       and 3 phase voltage
Gen:   Freq ---- Hz  <- Generator frequency
r 00V y 00V b 00V       and 3 phase voltage
Battery 12.6V        <- Other system information:
Events: 10000000        a) battery voltage
Hours run 00006         b) event input status:
Mains contactor: IN        inputs 1 to 8, left to right,
Gen contactor  : OUT       '1' = input active
>                          '0' = input inactive
                        c) hours run
                        d) mains and generator
                           contactor status
```

This message (or 'current status block') shows the current status of the Microstart and generator. Once this message has been displayed, the operator is able to control and interrogate Microstart by the use of 8 commands:

>MSCSB	Current Status Block	
>MSAAM	Adopt Auto Mode	
>MSAMM	Adopt Manual Mode	
>MSRTE	Run The Engine	(manual mode only)
>MSLOG	Load On Generator	(" " ")
>MSLOM	Load On Mains	(" " ")
>MSHTE	Halt The Engine	(" " ")
>MSARM	Adopt Reset Mode	(" " ")

On a typical VT100 set-up, the operator sends the above commands by typing the appropriate 5 characters on the terminal keyboard, followed by 'enter' (↵). If an incorrect code is entered, Microstart takes