EI

setpoint programmer

**TCS
TCS
TCS
TCS**

system
6000
6850

segment   **mode**

`0.3 TIME H`

setpoint

`+ 68.50`

high
chn 1 2 3 4 5 6 7 8
low

| INS | SEG | △ |
| MAN | RUN | ▽ |

**product
specification**

Setpoint programmer: Features

- Runs any 1 of 9 stored programmes.
- Programme length of up to 80 segments.
- Pushbutton masking feature.

- No options.
- All programmer modules are identical and interchangeable.
- Remote monitoring and programme access via a simple serial link.

- Built-in diagnostic routines.
- Field proven unit with a two year warranty.
- Fully compatible with the TCS range of advanced instrumentation.

Description

The 6850 setpoint programmer utilises the flexibility of modern microprocessor technology to provide an extremely versatile profiling unit.

The 6850 enables the user to set up the instrument using a simple plug-in hand-held terminal to enter the parameters. As each 6850 is identical, they are interchangeable, with the technician rapidly characterising the instrument on site. Spares holding is thus reduced to a minimum. Removal of the hand-held terminal ensures security of the settings in a battery supported memory.

The purpose of the instrument is to provide a setpoint to a controller. The setpoint is made to vary as a function of time, following a predetermined profile. This profile (programme) is split into a number of segments with the setpoint, during each segment, being able to maintain a fixed level for a defined time or increase/decrease to a target level at a defined rate. Up to nine such programmes may be stored in the unit's memory, with 80 segments being available for use. Inspection and alteration of the programme characteristics may be carried out without interruption of the programme being run.
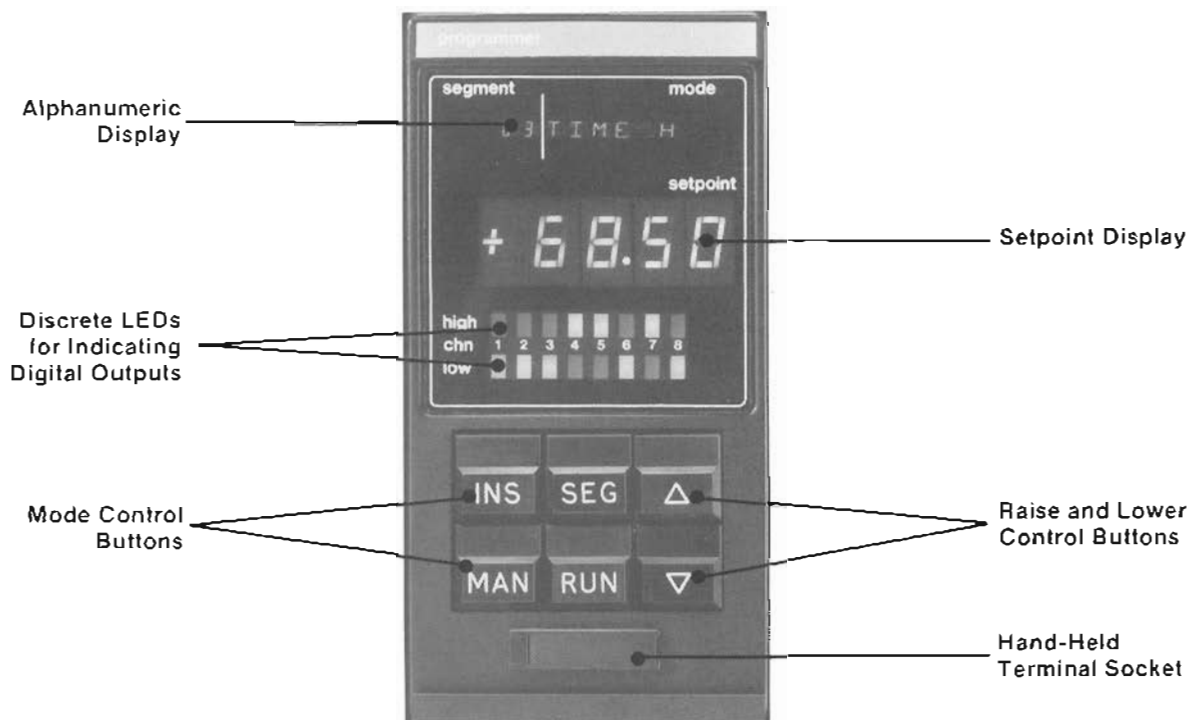
In addition to the ramped output a second analogue output may be given a certain value for the duration of each segment, this output making a step change as the programme advances a segment

A number of digital inputs and outputs (eight of each) permit logic strategies to be implemented. Typically, the inputs may be used to force the programmer into Track and Hold modes, and the outputs may be preset to carry out, for instance, the switching on and off of compressors

The analogue and digital levels will interface to signals used in the System 6000 range of instruments. The RS422 serial link allows a remote intelligent device to monitor and update the operation of the programmer Interfacing to RS232, TTL and fibre-optic links may also be carried out.

High levels of reliability are offered by this instrument which, with its own integral diagnostic routines, enables complex and exacting profiles to be performed.

Alphanumeric Display

Setpoint Display

Discrete LEDs for Indicating Digital Outputs

Mode Control Buttons

Raise and Lower Control Buttons

Hand-Held Terminal Socket

Operator displays and controls

Operator displays

Alphanumeric Display
Row of 8 red 17 segment LEDs display 64 character ASCII to indicate:
1) (primary mode)
Segment number and condition (track, manual, hold, wait, up, down, time, reset, end. With units of time for, up, down and time)
2) (secondary mode)
By using raise/lower buttons to scroll through a parameter list, status of current segment (typically time left if in timed segment, set slope if in ramping, value of process variable analogue input and value of second analogue output).

Setpoint Display
4-digit, orange LED display with decimal point and sign to indicate:
1) (primary mode)
Current value of the setpoint output in engineering units.
2) (secondary mode)
The number of the programme being executed.

Output Status
Two rows of eight LEDs programmed to indicate the high or low state of each digital output.

Operator controls

Operation Mode Selection
2 push-buttons:
Manual (MAN) allows manual control of the output. (RUN) allows the 6850 to profile the output.

Function Selection
4 push-buttons:
Raise (▲) increments the output when (MAN) is pressed, increments the current segment number when (SEG) is pressed, or scrolls up the parameter list when (INS) is pressed. Lower (▼) decrements the output when (MAN) is pressed, decrements the current segment number when (SEG) is pressed, or scrolls down the parameter list when (INS) is pressed. Inspect (INS) activates the secondary display mode. Primary display mode is when (INS) is not depressed.

Applications

Environmental chamber control
Pressure testing
Generally a 6850 setpoint programmer would be linked up with a 6350 single-loop controller, or one loop of a 6358 multi-loop controller, to form a compact and versatile system providing an accurately controlled process variable, varying as a function of time. All System 6000 instruments use standard voltage and current levels for their analogue and digital interfaces which allows a number of profiled loops to be interconnected to form complex configurations. Comprehensive system interlocks are made which result in all control mode selections being both bumpless and procedureless. A typical programmer/controller combination is shown below with an example of the type of profiling that is simplified using these instruments.
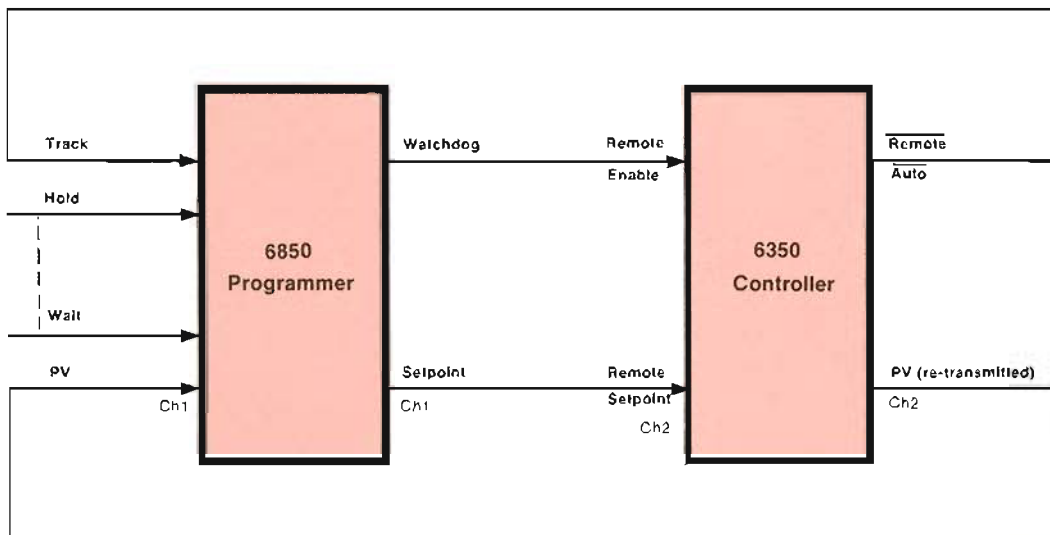

Programmer/Controller interconnections

A number of interconnections (analogue and digital) are made between the two instruments; these are best summarised by describing the track operating mode available on the programmer.

The track function operates in conjunction with the single analogue input provided on the 6850. The 6850 setpoint output can be forced to track this analogue input upon the track digital input going high. This would occur upon the 6350 being put into,

typically, a manual condition. The operator could now manually raise or lower the 6350 output, and would be assured that, upon reverting to remote auto programmed operation, no bump would occur in the setpoint

Typical profile
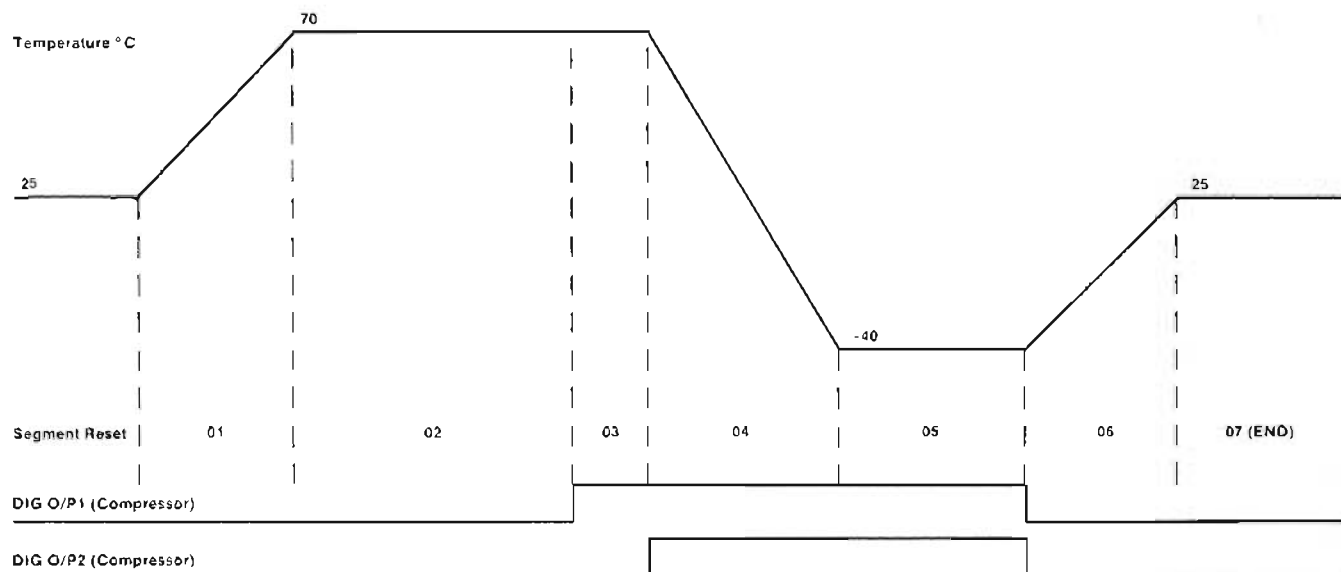
A programme consists of, in this example, seven segments (including the end segment) and a reset segment, and here would be typically used in the temperature profiling of an environmental chamber. The duration of each timed segment and the rate at which the output will ramp during the slope segments is selected by the hand-held terminal.

A number of the digital outputs could be set to predetermined states during the programme. The example illustrates how two outputs may be used to start compressors, the first bringing in one compressor slightly before the other.

In addition, (not illustrated), the second analogue output could be configured to, for example, bleed in a nitrogen purge at a certain pressure during segment number 2.

Communications

Every System 6000 microprocessor based instrument is fitted with an RS232 port and an RS422 port for serial data communications. The RS232 port is available via a front-panel socket and is used for the

8260 Hand-held programming terminal. The RS422 port is available on the module rear connector pins and is bussed onto the supervisory data link common to all modules All parameters that can be monitored

via the 8260 terminal can also be accessed and updated via the supervisory data link.

Hand-held terminal

Each System 6000 instrument can be set up using a plug-in 8260 Hand-held terminal. Every parameter is accessed by means of a simple 2 character command mnemonic and all data is entered directly in engineering units This technique ensures the accuracy and security of parameter settings.

Specification
Transmission Standard
2-wire RS232/V24 (±12V).

Data Rate
300 baud.

Character Length
10 bits made up of:
1 start + 7 data + 1 parity (even) + 1 stop.

The photograph shows an 8260 terminal plugged into the front panel of a 6850 programmer A full list of the available command parameters is given in the 6850 Facts Card

Multi-drop supervisory link

Every System 6000 instrument contains an RS422 communications port which enables it to send and receive command parameters over a simple four-wire link connected to other intelligent devices. The use of RS422 and the transmission of information in ASCII or Binary data format makes it particularly easy to

communicate with the 6850 programmer To hook the 6850 into a distributed control system requires no modification to the instrument and no further expenditure on options. The four-wire link is simply connected up so that the 6850 becomes part of the distributed control system. The illustration

shows how an array of 6850s can be directly connected to a supervisory computer which has an RS422 serial port. If the computer only has an RS232 serial port then an 8245 Communications Buffer Unit can be used to carry out the required RS232 to RS422 Conversion as shown.
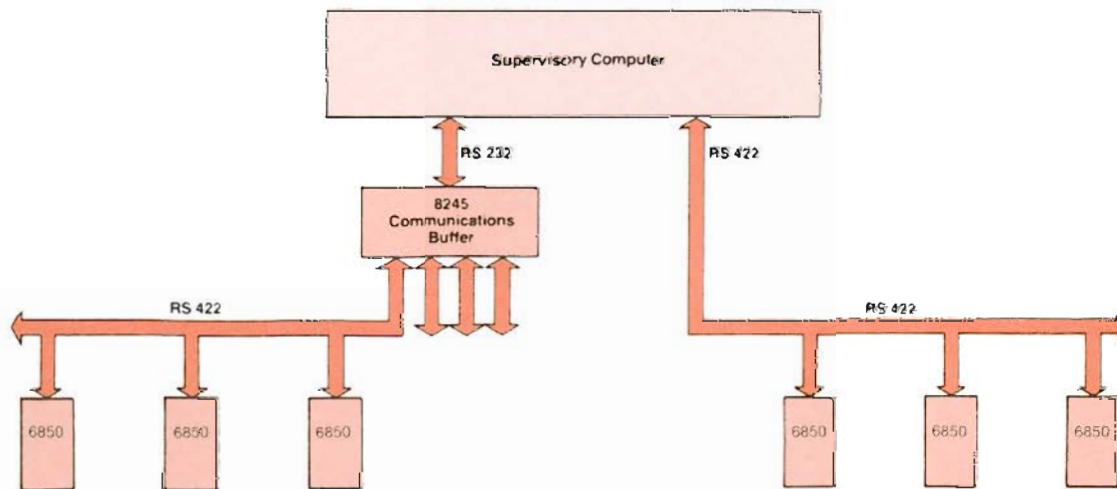
Specification
Transmission Standard
4-wire RS422 (0-5V).

Line Impedance
120-240 ohm twisted pair.

Line Length
4000 ft max (at 9600 baud).

Number of Units/Line
16.

Data Rate
Selectable from 110, 300, 600, 1200, 2400, 3600, 4800 or 9600 baud.

Character Length(ASCII/Binary)
10/11 bits — 300 to 9600 baud
11/12 bits — 110 baud (2 stop).

Protocol

All microprocessor based instruments in the System 6000 range employ a standard ANSI protocol known as BI-SYNCH. The exact form of BI-SYNCH implemented within System 6000 corresponds with the American National Standard specification.

ANSI – X3.28 – 2.5 – A4 Revision 1976

TCS have implemented both an ASCII and Binary version of this protocol within each instrument.

The ASCII mode is simplest to use as all data is transmitted in ASCII characters. The Binary mode offers a 4 to 1 increase in transmission speed by compressing the data into a binary format, and also supports additional features like Multi-Parameter and Enquiry Polling.

3

Input/Output signals
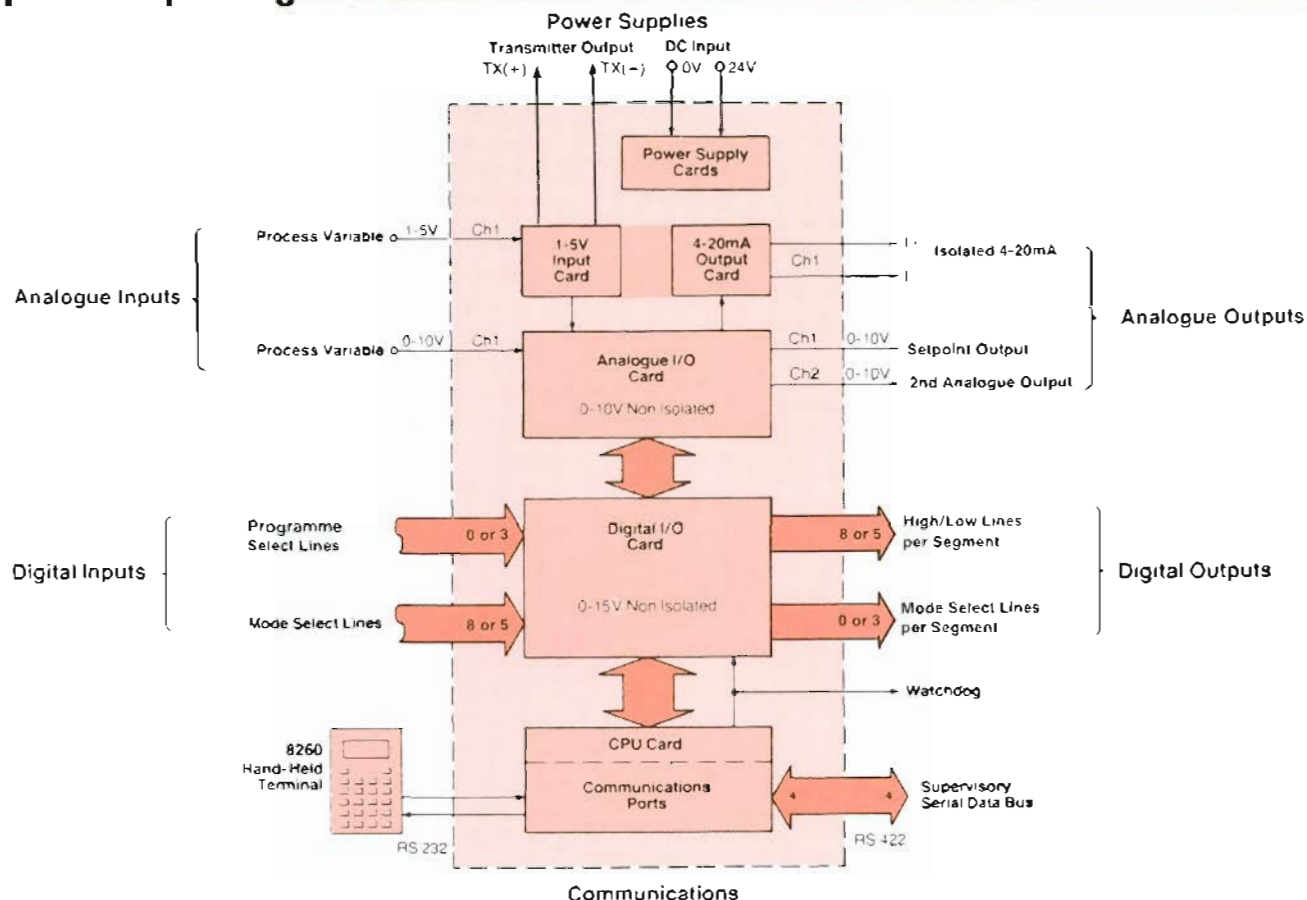
Analogue inputs

Number of Channels
1 direct non-isolated input or conditioned non-isolated input.

Channel Function
Forces output to this value when in track mode.

Input Signal Level
Direct input is 0-10V range.
Conditioned input is 1-5V or 4-20mA range with external sense resistor.

Resolution
2.5mV.

Accuracy
± 1 LSB max. over 0-50°C range for hardware.

Sampling Rate
ADC samples each channel every 24ms. (12ms if 2nd channel not selected).

Input Impedance
1MΩ pull-down to –5V on direct input
Greater than 10MΩ on conditioned input

Analogue outputs

Number of Channels
2 direct non-isolated outputs plus 1 isolated output.

Channel Functions
Channel 1 = Setpoint output.
Channel 2 = Second analogue output.

Output Signal Levels
Direct outputs are 0-10V range.
Isolated output is 4-20mA (channel 1 only).

Output Circuit Type
Medium-term analogue sample-and-hold circuits preceded by DAC

Output Resolution
12 bit binary (.025%) giving minimum analogue voltage steps of 2 5mV.

0-10V Output Accuracy
± 1 LSB max. over 0-50°C range.

Isolated Output Accuracy
± 0.5% of full scale.

Isolation Voltage (4-20mA)
± 50V minimum with respect to system ground.

Sample and Hold
DAC updates 1 channel every 12ms. i.e each channel is refreshed every 24ms.

Output Drift Rate Under Watchdog Failure Conditions
½mV/sec maximum (equivalent to 1% of full scale in 3 minutes)

Output Drive Capability
± 5mA for direct voltage outputs.

Digital inputs

Number of Inputs
8 external non-isolated inputs.

Input Functions
Software selectable to either:
1) 8 mode select lines or
2) 5 mode select lines and 3 programme select lines.

Input Voltage Levels
15V = logic one.
0V = logic zero.

Input Impedance
100kΩ pull-down to 0V (gives 150 μA logic one current).

Digital outputs

Number of Outputs
8 external non-isolated outputs plus Watchdog

Output Functions
1) 8 programmable hi or lo lines per segment or
2) 5 programmable hi or lo lines and 3 mode lines per segment.

Output Voltage Levels
15V = logic one.
0V = logic zero.

Output Drive Capability
2k2 open-collector pull-up to +15V supply, maximum logic zero sink current = 16mA.

Setpoint and analogue output characteristics

Setpoint Output
Range — high, low +9999 to -9999 in engineering units.
Second Channel Output
Range (per segment) — high, low +9999 to -9999 in engineering units

Setpoint Slope Setting
Range — 0.0001 to 9999 units per second, minute or hour.

Setpoint Time Setting
Range — 0.0001 to 9999 seconds, minutes or hours.

Power supplies

Input Voltage
(May be unsmoothed, full-wave rectified AC).
20–30V DC recommended operating range.
19–35V DC absolute maximum input limits.
Input Fuse Rating
2A.

Input Current
550mA without hand-held terminal
650mA with hand-held terminal.
Power Failure Detect Threshold
When input voltage falls below 16 5 ± 0.5V.
Remote Transmitter Supply
26V ± 1 5V at 4mA output.
30V ± 0.5V at 20mA output

± 50V minimum isolation with respect to system ground.
Memory Standby Battery
3 5V Lithium type
500mAh rating.
8-10 year shelf life.
5 year life minimum on continuous standby.

Mechanical details

All System 6000 microprocessor based instruments are supplied in 72mm wide metal housings fitted

with front-panel fascias and catch handles for module retention These may be used with a wide variety of

rack and panel mounting hardware as illustrated in the examples below.

7000 series racks

Up to six 6850 programmers may be fitted into a 7000 series 19 inch rack as shown Interconnections between instruments are made by wire wrapping while external connections may be brought out to 2 rows of 64 way screw terminal blocks fitted to the hinge down rear door. The 7000 series rack is also available with a panel mounting option, and a 10 inch half rack version for mounting up to three 6850s can also be supplied.

7900 powered sleeves

The powered sleeve allows a 6850 to be mounted with a mains power unit. This is incorporated in the associated 7850 Rear Termination Assembly which is also fitted with 2 output relays and gives access to all module connections via screw terminals. The 7900 assembly is available in single, 3 way or 6 way versions for mounting in panels from 1.5mm to 6.5mm thick A 6 way 19 inch rack mounting version can also be supplied

Overall dimensions in mm of housings illustrated:

	7000 rack	7900 sleeve
width	482	105
height	177	177
depth	380	423

Panel cut-out dimensions in mm:

	7000 rack	7900 sleeve
width	448.2	88.2
height	166.3	166 3

Details

For further details refer to:
6850 Microprocessor based programmer technical manual.

6850 Facts Card.
7850 Programmer rear termination assembly.

7900 Single or multi-way sleeve assembly for microprocessor based instrumentation.