

keyboard terminals, automotive and aircraft displays and instrumentation. As technology advances, it is conceivable that flat display panels could ultimately replace the CRT in black and white and colour TV sets, and several companies have already undertaken research and development programs along these lines.

Among the formats available in the Burroughs Self-Scan range are a variety of configurations capable of producing displays ranging from 16 digits to 256 digits, with or without memory, and for left-to-right or right-to-left character entry. These panels are capable of accepting high speed data entry. It should also be mentioned here that every Self-Scan panel display is supplied complete with the necessary drive electronics, character generator, and in some cases with a bezel. All can be supplied with MOS memory, and mounting kits and input/output connectors are available for each model.

Typical of the range is the MODEL SSD 1000-0041 display, a single row 16-position panel with associated drive electronics and memory. This display has a 64-character repertoire, and has overall dimensions of 8.5 x 2.25 x 1.91in (depth). Perhaps I should have converted to metrics here! Dot spacing in the 5 x 7 matrix format is on 0.06in centres, with two column spacing between characters. These panels are also available in modified form to display 18 characters. This is accomplished by using only one column of space to separate characters. Overall character height is 0.4in.

Another typical Self-Scan panel display is the Model BDS 40832-200 256-position display subsystem. As with the above example, this panel comes with all the necessary electronics, including the drivers, memory, timing, and character generation circuitry. This format is capable of displaying an eight-line 32 character per line message, has a full 64-character repertoire, a dot spacing of 0.04in, and a viewing distance of up to 18 feet. Two space columns are used to separate characters, while three dot rows separate the lines. Overall character height is 0.3in. The same basic construction is also

FLAT PANEL COLOUR TV DEVELOPED

Although this article has emphasised the Burroughs Corporation's Self-Scan gas discharge display panel range, the efforts of other companies such as Control Data, Westinghouse, National Cash Register, IBM, Northrop, Philips /Mullard, Hitachi, Sony, and Fujitsu should also be mentioned. Hitachi, for example, have just recently announced the development of "the world's first working prototype for a flat-profile colour TV."

The technique employed by Hitachi appears to be similar to that announced last year by Philips Research Laboratories, Eindhoven, for producing full colour displays. The approach used by Philips to get full colour displays is to

use a positive-column gas discharge, as in "neon" signs, instead of the negative glow of small neon lamps, thus allowing the use of ultra-violet sensitive phosphor coatings on the inside of the matrix holes in order to obtain the required colours. Colour information is provided by using triangles of three primary colours.

In applying the technique to television, Hitachi feed the "fluorescent diode" cathodes with timing information derived from the sync signals, while video modulation is fed to the anodes.

It is also worth noting here that the Sony Corporation has also announced that it is working on both black and white and colour TV sets using gas discharge flat panel displays.

available in units capable of displaying 128 characters (4 rows of 32 characters) and 64 characters (2 rows of 32 characters).

One particularly interesting development in this area is the analog bar-graph display. Operating on the Self-Scan principle, this display is a flat panel containing two separate bar graphs. Each bar is composed of 200 closely spaced segments so that, at normal viewing distances, the glowing segments blend into a continuous, but precisely controlled, bar length.

Two applications that are made to order for the bar graph are matching and comparison procedures. For example, if an operator must adjust some controls until two (or more) voltages (flow rates, pressures etc) are the same, there is probably no simpler way than to adjust them until two adjacent bars are the same length. Similarly, such a device would be suitable for use in an aircraft where it would enable a pilot to find out at a glance if all engines in the aircraft were equally loaded. Other applications for the bar-graph display include automobile displays, depth indicators, and level indicators.

A number of companies are already using Self-Scan panel displays in a variety of

commercial products. For example, Self-Scan panel displays are used in advanced navigation/guidance systems being developed by Delco Electronics, Division of General Motors. The system incorporates a single row high brightness 18-position alphanumeric readout in a control display unit that is dimmable. Integrated with standard cockpit instrumentation, the display exhibits aircraft position data and guidance signals computed by the system from basic sensor inputs.

In another application, Kustom Electronics Incorporated, Chanute, Kansas, is using a 256-character generator Self-Scan panel display in their new two-way Digital Mobile Communication System. The system allows police officers direct access to law enforcement computer data bases, the information obtained being displayed on the Self-Scan panel fitted into the police vehicle. Data keyed into the mobile terminal is also displayed on the panel, and can be corrected before transmission. Although the first installations of this system are in police cars, the system has potential application wherever a two-way computer terminal is required.

Several companies are currently manufacturing electronic calculators which incorporate gas discharge display panels. The panels used here are similar in operation to the Self-Scan range, and are designated by Burroughs as the "Panaplex II" range. Among the companies involved are Computer Design of Santa Monica, California, the Keystone Division of Berkey Photo Incorporated of Paramus, New Jersey, and the Eldorado Electrodata Corporation of Concord, California. A range of Panaplex displays is also available for use in digital clocks.

At the present time, the flat gas discharge panel and the CRT cannot be presented as one superior to the other. Both have their advantages and disadvantages for particular applications, and both will continue to be in demand.

With so much time, money, and effort being expended, it is not unreasonable to predict that the flat screen display, in one form or another, will become a serious challenge to the fragile and bulky CRT, and may eventually replace it altogether. Such is the progress of technology. 



Above, a 256-position Self-Scan panel forms part of this mobile computer terminal fitted into a police patrol vehicle. The terminal allows direct access to a central police computer without having to go through the normal voice communication channels.

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