
*This 256-position panel has a full 64-character repertoire, and is capable of displaying an eight-line, 32-character-per-line message.*

of the basic principles of operation. As can be seen from the exploded view, the Self-Scan panel display consists of a rear glass cover, grooved to accept the rear (scan) anodes; a layer of vertical cathode strips (which includes the reset and keep alive cathodes plus the display cathodes); a centre insulating sheet drilled in a matrix format to form the display cavities; the front display anodes; and a front glass cover. These components are sandwiched together, sealed and filled with a noble gas mixture comprised mainly of neon.

The operation of the panel can best be explained by considering the unit as two separate devices. The rear portion of the panel, consisting of the grooved rear glass plate, the rear (scan) anodes, and the rear side of the cathode strip performs the scan or glow stepping routine. The cathode strips are bussed alternately to a 3-phase clock circuit, while the rear anodes are tied through appropriate load resistors to a 250V DC supply rail.

When the panel is energised, ionisation forms around the area of the keep alive cathodes, which are at ground potential, and the keep alive anodes, which are at 250V and above the firing potential. Once ionisation has formed at the keep alive cell, metastable atoms drift along the rear plate grooves to the vicinity of the reset cathode.

The panel electronics are arranged so that the rear anodes are held at +250V while the cathodes are sequentially brought to ground. When the reset cathode is grounded, a glow discharge (or ionisation) is established at each intersection of the reset cathode and the rear anodes. Metastable atoms now diffuse along the scan grooves to the rear of the first cathode. When this cathode is grounded and the reset circuit is opened, the glow transfers from the rear of the reset cathode to the primed area at the interesections of the rear anodes and the first cathode.

Metastable atoms now diffuse along the rear grooves to the second cathode strip and also through the tiny priming apertures in the first cathode strip to the diplay cell on the top of the cathode. The first cathode circuit now opens and the second cathode circuit goes to ground, transferring the glow to the intersections of the rear anodes and the second cathode. The diffusing metastable atoms will now prime the rear of the third cathode and the display cells in front of the second cathode. This process continues until all of the cathodes have been ionised sequentially.

At the last cathode in the display, the electronics senses the completed scan, resets to the first cathode strip (reset cathode), and begins the scan sequence again. The scanning rate is approximately 85Hz, so there is no perceivable flicker ie. the message on the display panel will appear continuous. The procedure detailed above would be analogous to the scanning of a CRT if the entire face of the tube was scanned in one horizontal sweep.

The panel's display section, consisting of the front glass cover, the front (display) anodes, the centre insulating sheet, and the top surface of the cathodes is addressed to write the message. This is achieved by raising the appropriate display anode to a 250V potential in synchronisation with the establishment of the scan glow on the rear side of one of the cathodes and the priming of the desired display cell. In other words, the front display anodes are addressed in synchronisation with the scanning section to cause the desired display cells to illuminate, thereby forming a message.

As the panel operates and the rear glow steps along the rear of the panel, the front anodes are addressed a full column at a time to enter the data. Fig 2 shows the panel when phase 2 is grounded and a glow is established on the rear of cathode 2. The information to be written on the panel are the letters "c" and "d", represented by the shaded cells. The scan is at column 2. Anode drivers, represented in the figure by switches, are closed at positions b and f. Therefore, the cells at the intersection of b and f and column 2 will be energised, as indicated by the solid circles.

Commercially available DC gas discharge display panels are used primarily for alphanumeric displays. In expanded form, however, they are capable of graphics presentation, and custom units have been built for this purpose. For alphanumerics, each character consists of a 5 x 7 array of display elements and is generated by a ROM character generator which drives the display anodes.

Since the gas mixture in which the discharge takes place is composed primarily of neon, the colour of the display is the typical orange-red of the neon cathode glow. By simply adding inexpensive optical filters over the faceplate, variations in colour between amber and deep red can be achieved. For applications where a red or orange display is not desirable, phosphors may be incorporated into the panel to exhibit other colours. These phosphors are photoluminescently excited by the ultraviolet (UV) radiation present in the gas discharge, and usually require an op-

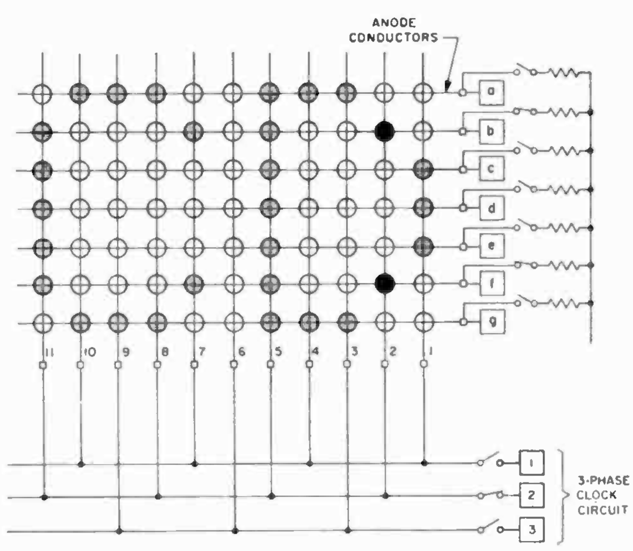


*Fig 2: this diagram illustrates the method of selecting dots in a scanned gas discharge panel. Switches are used for row selection, whilst a 3-phase clock is used for scanning the columns.*