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# Series SixTM PLC
## Programmable Controllers

GEK-84857B

July, 1989

## High Density TTL
Output Module

### General Description

The High-Density Transistor Transistor Logic (TTL) Output module, with indicating Light-Emitting Diodes (LEDs, can be utilized in an I/O rack, or in any of the 1/O slots in a Series Six Plus Central Processor Unit (CPU), to provide a compact, optically-isolated interface between the backplane I/O bus and field digital circuitry (TTL).

Each module provides 32 active low outputs divided into 4 groups, each containing 8 outputs. All 32 outputs (4 groups) are normally updated in the course of one I/O scan. A common return point connects the 32 loads on the High-Density TTL Output module.

The placement of a jumper allows the selection of disabling all outputs during a reset condition or the holding of the last state presented to the outputs even if a reset or failure should occur.

By placement of a second jumper on the module the user can select whether the data received from the CPU is inverted (complemented) or non-inverted before controlling the outputs. Two LED indicators identify the selected modes of operation.

The module is supplied in one version with 32 LEDs (one for each output) indicating the state of each output individually. A particular LED will be illuminated whenever its corresponding output is on.

The High-Density TTL Output module features and benefits are summarized in Table 1. Refer to Table 3 for module specifications.

**Table 1, Features and Benefits**

| Features | Benefits |
|---|---|
| 32 TTL (Logic Level) output points per module. | Low cost per output point.<br>Efficient use of I/O rack space. |
| Output Indicating lights. | Visual indication at the module of the OFF/ON state of the outputs. |
| Programmable hold last commanded state of outputs. | The last commanded output states are retained throughout a Series Six power-down or system fault so long as the user power is uninterrupted. |
| **Applications** | |
| Interface from CPU to:<br>Devices having TTL or CMOS inputs<br>Other low voltage<br>Low current loads | Compact I/O System |

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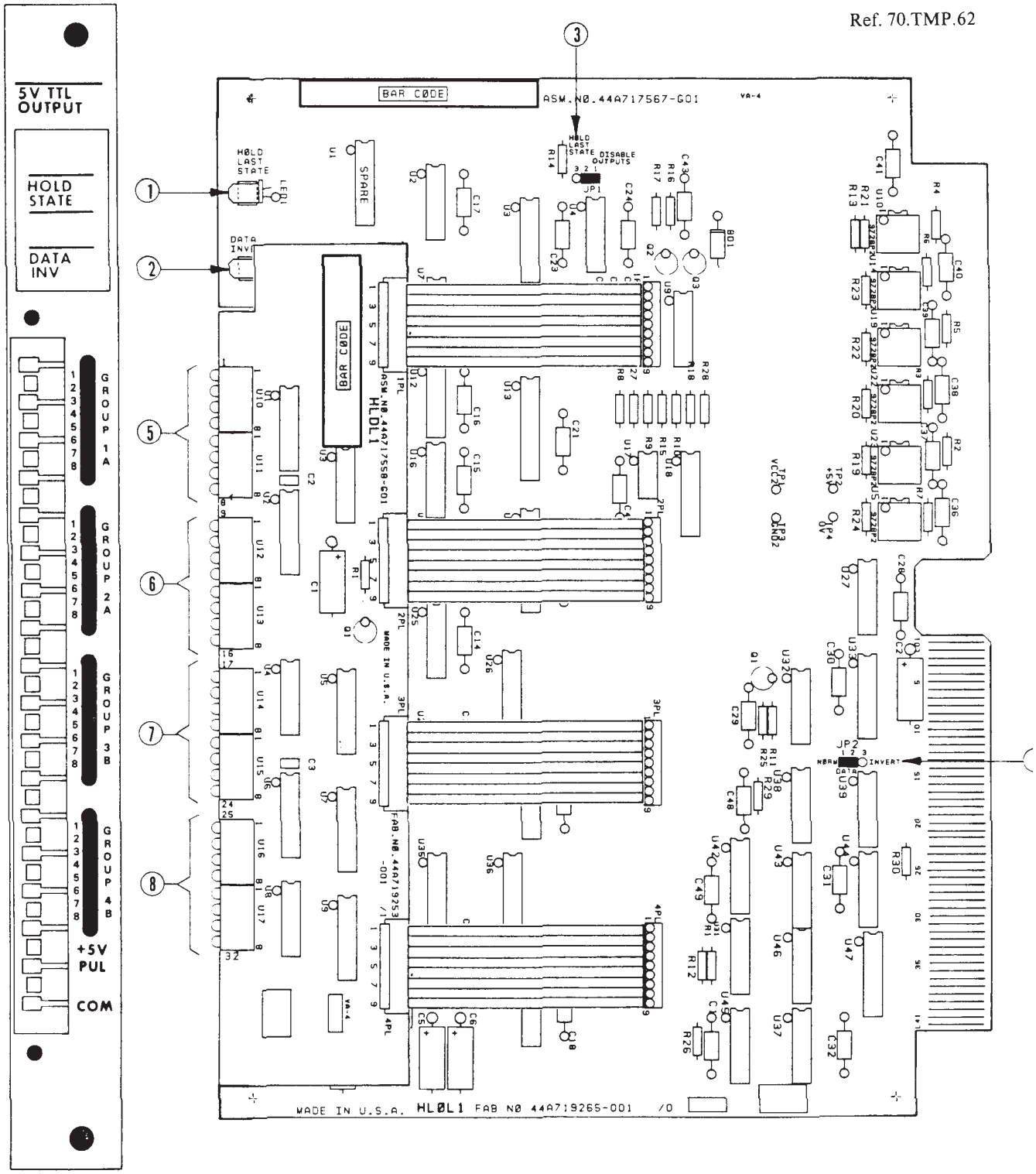



**Figure 1. User Items (Part 1 of 2) High Density TTL Output, with Status Indicator Lights**

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1. LED Indicator
   ON: Hold Last State
   OFF: Disable Outputs

2. LED Indicator
   ON: Output Data Inverted (0 = Low)
   OFF: Output Data Non-Inverted (1 = Low)

3. Jumper JP1: 1-2 Position, Disable Outputs
   2-3 Position, Hold Last State

4. Jumper JP2: 1-2 Position, Normal
   2-3 Position, Data Inverted

LEDs - Illuminated when corresponding output is turned ON (low).

| Key | Group | Outputs | LED |
|---|---|---|---|
| 5. | 1 | 1 through 8 | 1 through 8 |
| 6. | 2 | 1 through 8 | 9 through 16 |
| 7. | 3 | 1 through 8 | 17 through 24 |
| 8. | 4 | 1 through 8 | 25 through 32 |

**Figure 1. User Items (Part 2 of 2) Cont'd**

**Table 2. Dip Switch Settings**

| Output Number | Dip Switch Position | | | | | Output Number | Dip Switch Position | | | | | Output Number | Dip Switch Position | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | | 7 | 6 | 5 | 4 | 3 | | 7 | 6 | 5 | 4 | 3 |
| 1- 32 | | | | | | 353-384 | | X | | X | X | 705-736 | X | | X | X | |
| 33- 64 | | | | | X | 385-416 | | X | X | | | 737-768 | X | | X | X | X |
| 65- 96 | | | | X | | 417-448 | | X | X | | X | 769-800 | X | X | | | |
| 97-128 | | | | X | X | 449-480 | | X | X | X | | 801-832 | X | X | | | X |
| 129-160 | | | X | | | 481-512 | | X | X | X | X | 833-864 | X | X | | X | |
| 161-192 | | | X | | X | 513-544 | X | | | | | 865-896 | X | X | | X | X |
| 193-224 | | | X | X | | 545-576 | X | | | | X | 897-928 | X | X | X | | |
| 225-256 | | | X | X | X | 577-608 | X | | | X | | 929-960 | X | X | X | | X |
| 257-288 | | X | | | | 609-640 | X | | | X | X | 961-992 | X | X | X | X | |
| 289-320 | | X | | | X | 641-672 | X | | X | | | 993-1024 | X | X | X | X | X |
| 321-352 | | X | | X | | 673-704 | X | | X | | X | | (NOT USED) | | | | |

[X] = Switch in OPEN Position (Depressed to the Left)
Switches No. 1 and No. 2 should be in CLOSED Position

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## Installation

The High-Density TTL Output module can be installed in an I/O rack or in a Series Six Plus CPU rack. Before installing the module, the Dual-In-line-Package (DIP) switches immediately behind the card slot on the rack backplane should be set to reserve 32 consecutive bits in the appropriate output status table of the CPU. For specific DIP switch settings, refer to Table 2.

The circuit-board jumpers must be set to configure the module to operate in the desired system configuration. For example: invert or non-invert and disable outputs or hold last state. Refer to Figure 1, User Items.

The response to a power-down or Series Six system fault is defined by jumper 1 (JPl). Position l-2 (DISABLE OUTPUTS) turns all outputs OFF in such cases. Position 2-3 (HOLD LAST STATE) would maintain the last commanded state of the outputs until new valid data is presented or user power is removed. In either case all outputs are initialized OFF when user power is turned on.

Jumper 2 (JP2) determines what state commanded by the CPU is used to tum an output ON. In the Normal mode (non-inverting) the ON state (active low output) results when a logical 1 is in the Output Status Table. Conversely, an OFF state (output high) exists with a 0 in the Output Status Table. Just the opposite output state versus output status table exists if the module is placed in the Inverting mode.

When using a High-Density Output module to drive a High-Density Input module, both modules should be configured in the same mode (Inverting or Non-Inverting). Following this procedure ensures that the bit values sent from the Output Status Table to the Input Status Table are not inverted.

It is recommended that the extraction/insertion tool furnished with the CPU be used to remove or install the circuit boards. With the board in place in the rack, the edge connector on the faceplate should be slipped over the circuit board so that the proper contact is made. The faceplate can then be secured to the rack using the thumbscrews at the top and bottom.

Refer to Figure 2 for a typical symbolic output circuit.

Refer to Figure 3 for typical user connections to this module. If active-pullup outputs are desired with this TTL module, the PUL terminal should be connected to the positive terminal of the output supply (0 to 15 V dc). For open-collector operation, the PUL terminal should be left open (no connection).

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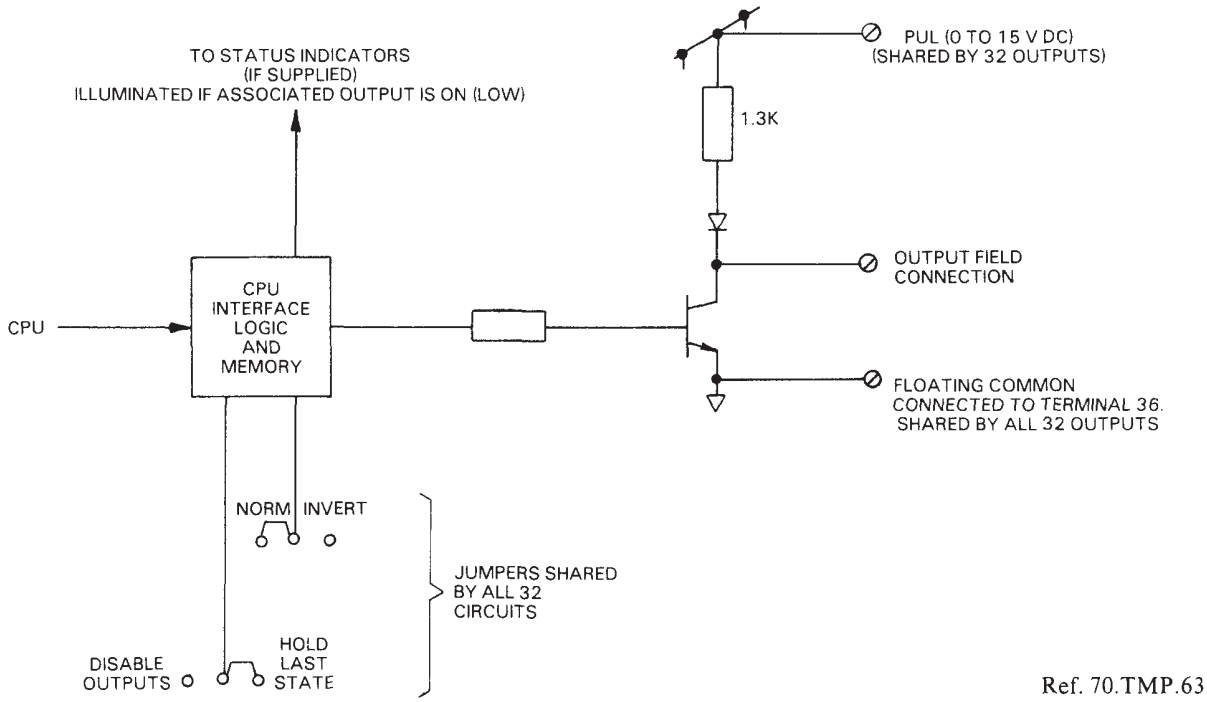
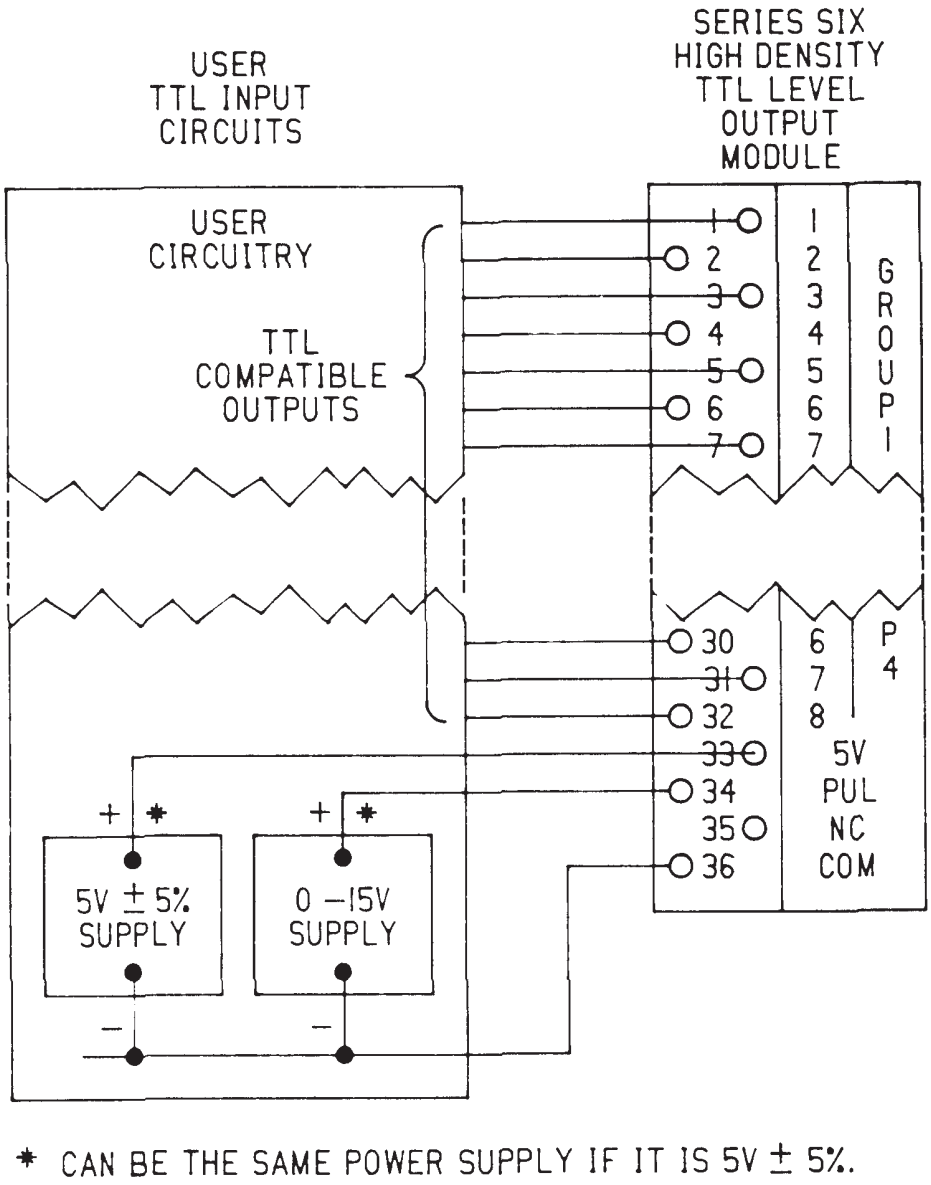



**Figure 2. Simplified Symbolic Output Circuit**

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Ref. 70.TMP.64




* CAN BE THE SAME POWER SUPPLY IF IT IS 5V ± 5%.

**Figure 3. Typical User Output Connections up to 32 Outputs**

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**Table 3. Specifications**

| | |
|---|---|
| **Dimensions:** | Circuit Board: 8.15 x 11.0 (inches) 208 x 280 (mm)<br>Faceplate: 12.46 x 1.175 (inches) 317 x 30 (mm) |
| **Storage Temperature:** | **-20" to +80°C** |
| **Operating Temperature:** | 0° . 60 °C at the outside of rack. |
| **Humidity:** | 5 to 95% (non-condensing) |
| **Altitude:** | Up to 10,000 feet above sea level (operating), |
| **Isolation:** | Series Six common to user common.<br>2000 V dc for one second (maximum)<br>240 V ac 50/60Hz continuous (maximum).<br>Rate of change (noise immunity) 500 V/microsecond (maximum). |
| Power **Requirements:** | Supplied by I/O rack or Series 60 rack:<br>**+5** V dc, 180 mA **maximum** or **3** power units.<br>Ref. Chapter 2 **section 2,** I/O module load, Installation and Maintenance Manual, GEK-25361. |
| User **Supplied Power:** | To user on module logic at terminal 33.<br>Voltage including ripple 5 0.25 V dc<br>Current: 550 mA (with status indicating LEDs)<br>To user output pull up at terminal 34.<br>Voltage including ripple 0 to 15 V dc<br>Equivalent load resistance = 1.3K number of outputs used. |
| **Output Capabilities:** | ON state, output low<br>Module acts as a current sink.<br>25 milliamps per output for TTL compatibility 0.5 V dc.<br>50 milliamps per output point maximum 1.0 V dc.<br>OFF state, output high.<br>Open collector operation if PUL (terminal **34)** is left open.<br>Sources current as voltage source equal to terminal 34 voltage minus 0.6 volts in series with 1.3K resistor. |
| **Response Time:** | ON to OFF or OFF to ON, 40 microseconds maximum. |

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**NOTE**

For previous revisions of **5V** TI'L Output modules (911A and 911B) see GEK-83530.

**Table 4. Ordering Information**

| Module | Circuit Board and Faceplate | Circuit Board Only | Faceplate Only |
|---|---|---|---|
| 5V TTL Output With Status Indicators | IC6OOBF921A | IC600YB921A | IC600FP921A |

**Catalog Number Revision** Suffix

The equipment iisted above having the catalog numbers shown and the same equipment having a higher alpha suffix is designed for listing by UL for use as auxiliary control devices. The equipment is a direct replacement for equipment having the same catalog number but a lower alpha suffix.

This symbol on the nameplate means the product is listed by Underwriters Laboratories Inc. (UL Standard No. 508, Industrial Control Equipment, subsection Electronic Power Conversion Equipment.)

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