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Technical Practice

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UT-16 UNIVERSAL TRANSFER UNIT

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1. General Description

1.1 PRACTICE In the event that this practice is reissued, the reason for the reissue will be stated in this paragraph.

1.2 PRODUCT OVERVIEW The UT-16 Universal Transfer Unit is designed as a general-purpose switching device for use with telephone, data, and low-power electrical signals. The unit is arranged as 16 two-wire circuits. Each circuit has an input, a normal output, and a transfer output. The two wires of each circuit are designated as tip and ring, reflecting the telephony orientation of the UT-16.

1.3 FEATURES UT-16 features include 16 circuits of transfer, two LED status indicators, a manual transfer switch, an auxiliary relay contact, a return to normal mode delay timer, and universal powering. Also included are provisions for a normally open, normally closed, or logic level signal to control the operating mode. The unit is completely self-contained in a wall-mounted cabinet. Interconnections are made using standard 25-pair telephone-type plugs and a terminal strip. This method provides simple, time-efficient installation and maintenance.

1.4 POWER REQUIREMENTS The UT-16 can be powered with 24Vac, –24Vdc, or –48Vdc. There are no switches to set or straps to cut. The UT-16 automatically adjusts for the power that is connected.

1.5 DESCRIPTION The UT-16 consists of a precision fabricated printed circuit board, and an injection molded housing consisting of a base and detachable cover. The thermoplastic material used for the housing conforms to industry-recognized flame retardant standards. The UT-16 measures 8.75 inches (22.2cm) square, 3.25 inches (8.3cm) deep, and weighs approximately two pounds (0.9kg). It wall mounts with four screws.

1.6 FCC REGISTRATION The UT-16 is intended for direct connection to telephone circuits. The FCC Registration Number is BVV8VH-60403-PX-N. Ringer Equivalence is 0.0B.

2. Applications

2.1 PRIMARY APPLICATION The UT-16 Universal Transfer Unit is intended to serve as a useful “building block” for special applications. Up to 16 two-wire input pairs can be switched between the normal and transfer outputs. The switching is done “metallically” with electromechanical relays. This method provides excellent AC and DC isolation between connected and uncommitted circuits.

2.2 TELEPHONE CIRCUITS A typical application would be with two-wire telephone circuits. These circuits could include loop start trunks, ground start trunks, auto ring-down circuits, and private lines. Because the UT-16 is configured to transfer

16 independent pairs, four- and six-wire E&M circuits, four-wire leased lines, and other special circuits can be connected. A power failure or contact closure could cause the UT-16 to reroute telephone circuits from local equipment to a backup equipment center.

2.3 DATA LINES Data lines that do not require special shielding can be switched by the UT-16. A prime example would be 10-BaseT local area network cabling. A normal and emergency routing scenario could be created, with the UT-16 providing the switching.

2.4 A/B SWITCH The UT-16 also can be considered as a giant A/B switch, with 32 individual inputs connecting to 32 normal and transfer outputs. Low power control signals can be switched between normal and emergency equipment.

2.5 TRANSFER CONTROL LINES The UT-16 contains two transfer control lines: contact input and logic input. These inputs allow an external signal to place the UT-16 in the transfer mode. With this capability, the UT-16 can be configured into a number of different settings. The contact input allows connection of a normally open (not shorted) or normally closed (shorted) contact. The logic input allows connection of a logic level signal. The logic input is useful as some equipment provides an operating status signal in the form of a logic signal—logic high for normal operation, logic low when transfer is requested.

2.6 RETURN TO NORMAL MODE DELAY TIMER A unique circuit provides a time delay between when power is restored, or a transfer control line returns to its normal state, and when the 16 circuits return to their normal, non-transfer mode. The delay timer is adjustable from one to 15 minutes in one-minute increments. A possible delay timer application would be to ensure that a communications system has completely reset prior to the UT-16 returning to the normal mode.

2.7 AUXILIARY RELAY CONTACT An isolated relay contact is available for installer-selected applications. Auxiliary Relay Contact NO1 is a normally open (not shorted) contact that closes (shorts) when the unit goes into the transfer mode.

2.8 USING MULTIPLE UT-16s Multiple UT-16s can be connected to provide more than 16 circuits of transfer. The transfer control lines are specifically configured to allow bridging (connecting in parallel). A virtually unlimited number of UT-16s can be installed together when the contact input is used. Up to six units can be connected together when the logic input is used.

2.9 ALTERNATE PRODUCT—THE UT-8 For smaller applications, Gordon Kapes, Inc. manufactures the UT-8. Essentially identical to the UT-16, the UT-8 provides eight circuits of transfer. Contact Gordon Kapes, Inc. for details.

3. Installation

3.1 WORDS OF CAUTION As with any product, installing the UT-16 requires a safety first approach.

Warning: Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch non-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

3.2 CHECKING FOR DAMAGE The UT-16 should be inspected for damage immediately upon receipt. A claim should be filed with the shipper if damage is found. A replacement should be ordered if necessary.

3.3 INSTALLATION KIT Included in each UT-16 shipping carton is an installation kit. Each kit contains four #8 pan head screws and two nylon cable ties.

3.4 THE COVER The cover is secured via two clamp screws located on the top and bottom of the cover. Remove the cover at this time.

3.5 MOUNTING The UT-16 wall mounts using four #8 screws appropriate for the wall material. Four #8 pan head screws are contained in the installation kit. Use these if suitable.

3.6 UT-16 CONNECTIONS All connections to the UT-16 are made via two 25-pair plugs P1 and P2, and a 6-position screw terminal strip TS1. The installer must provide two 25-pair cable mounted connectors to mate with P1 and P2. Figure 2, located at the end of this practice, gives detailed connection information. Refer to this figure when reading the installation procedures.

3.7 INSTALLING AND TERMINATING THE 25-PAIR CONNECTORS Install the two 25-pair cable mounted connectors into plugs P1 and P2. Secure them using the fastener straps that are attached to the plugs. Terminate the cables (e.g., in a “66” type block).

3.8 CONNECTING POWER The UT-16 requires an external source of power. This can be nominal 24Vac, –24Vdc, or –48Vdc. The UT-16 automatically adjusts to match the power that is connected. The power source is connected to terminals 1 and 2 of the terminal strip.

Powering with 24Vac: Connect one lead of the 24Vac to terminal 1 of TS1; the other 24Vac lead to terminal 2. When using the UT-16 with 24Vac, it is important that both sides of the 24Vac be floating (isolated) from earth ground. The 24Vac power transformer must be a Class 2 type, 10VA minimum. Failure to provide this condition can result in incorrect UT-16 operation.

Powering with –24Vdc: Connect power supply ground to terminal 1 of TS1; –24Vdc to terminal 2.

Powering with –48Vdc: Connect power supply ground to terminal 1 of TS1; –48Vdc to terminal 2.

3.9 TELEPHONE LINE CONNECTIONS Referring to Figure 2 located at the end of this practice, cross-connect the telephone, or other selected cable pairs with the inputs and outputs. Three cable pairs are cross-connected for each of the 16 circuits.

3.10 USING THE TRANSFER CONTROL LINES The UT-16 has two transfer control lines: contact input and logic input. The contact input is designed to be connected to a variety of signals. Examples include a manual switch or a contact provided by remote control equipment. Signals compatible with the UT-16’s contact input can be in the form of an isolated relay contact or a contact that closes or opens in reference to ground. The logic input is a different breed. It wants to see logic current, such as from a 5Vdc digital circuit, when the UT-16 should be in the normal mode.

Using the transfer control lines is really quite easy. Start by determining what type of contact or logic signal is to be connected, and set the UT-16 mode switch to the appropriate position. Then connect the signal to the appropriate transfer control line.

3.11 THE MODE SWITCH The UT-16 contains a 3-position slide switch, labeled MODE, which is used to set which transfer control line is active and how the UT-16 will respond. The three positions are labeled NO, NC, and LOGIC.

Note: If a signal is not going to be connected to the transfer control lines, set the mode switch to the NO position. Setting the mode switch to any other position without connecting the appropriate input signal will cause the UT-16 to stay "locked" in the transfer mode.

NO Mode: Setting the mode switch to the NO position places the UT-16 in the normally open contact mode of operation. In this mode the contact input is connected to a normally open (not shorted) contact that closes (shorts) when transfer is requested. The UT-16 can return to the normal, non-transfer mode once the contact opens. In the NO mode the logic input is not used. A signal connected to the logic input is not recognized.

NC Mode: Setting the mode switch to the NC position places the UT-16 in the normally closed contact mode of operation. In this mode the contact input is connected to a normally closed (shorted) contact that opens when transfer is requested. The UT-16 can return to the normal mode once the contact again closes. In the NC mode the logic input is not used. A signal connected to the logic input is not recognized.

Logic Mode: Setting the mode switch to the LOGIC position gives the logic input its moment of glory. In this mode the logic input is connected to a logic signal that is logic high for normal UT-16 operation. This logic signal must change to a logic low when transfer is requested. The UT-16 can return to the normal mode when a logic high is again present. In the LOGIC mode the contact input is not used. A signal connected to the contact input is not recognized.

3.12 CONNECTING TO THE TRANSFER CONTROL LINES In the previous paragraph you should have selected the UT-16 operating mode and set the mode switch to the desired setting. Follow the connection information for the desired mode of operation: NO, NC, or LOGIC.

NO Mode: If you have selected the normally open mode of operation, follow this section when connecting the UT-16 to your control signal.

Isolated Contact: If your configuration provides an isolated, normally open (not shorted) contact, connect its leads to terminals 3 and 4 of the terminal strip. An isolated contact provides two leads, neither of which is connected to ground.

Closure to Ground: If your configuration provides a normally open (not shorted) contact that closes (shorts) in reference to ground, connect the contact to the terminal 3 of the terminal strip; connect ground to terminal 4.

NC Mode: If you have selected the normally closed mode of operation, follow this section when connecting the UT-16 to your control signal.

Isolated Contact: If your configuration provides an isolated, normally closed (shorted) contact, connect its leads to terminals 3 and 4 of the terminal strip. An isolated contact provides two leads, neither of which is connected to ground.

Closure to Ground: If your configuration provides a normally closed (shorted) contact that opens (removes short) in reference to ground, connect the contact to terminal 3 of the terminal strip; connect ground to terminal 4.

Logic Mode: If you have selected the logic mode of operation, follow this paragraph when connecting the UT-16 to your control signal. Connect the positive lead of the logic signal to terminal 5 of the terminal strip. Connect the common, ground, or negative lead of the logic signal to terminal 6 of the terminal strip.

3.13 RETURN TO NORMAL MODE DELAY TIMER The UT-16 incorporates a delay timer circuit whose purpose is to allow time for a related piece of equipment to completely reset prior to the UT-16 returning to the normal, non-transfer mode. The timer is activated upon the transfer control input (contact or logic) going from the transfer state to the normal state, or when power is again applied to the unit after a power interruption. Only after the timer has gone through a complete cycle will the 16 circuits return to the normal mode. The delay timer is configurable over a time period of one to 15 minutes in one-minute increments. The delay timer function can also be disabled. Four positions of a DIP switch are used to set the timer interval. Refer to Figure 1 for details on setting the time interval.

Figure 1 Time Interval Settings

Switch	Function
1	ON adds 1 minute
2	ON adds 2 minutes
3	ON adds 4 minutes
4	ON adds 8 minutes

All switches OFF disables the delay timer function.

3.14 AUXILIARY RELAY CONTACT The UT-16 provides an isolated relay contact for use in installer-selected applications. Auxiliary relay contact NO1 closes (shorts) whenever the unit is in the transfer mode.

3.15 MULTIPLE UNITS Additional UT-16 units easily can be connected to provide transfer for more than 16 circuits. The following paragraphs detail the various installation scenarios.

NO or NC Modes: The contact input connections of a virtually unlimited number of UT-16 units can be bridged together (connected in parallel). Connect the first UT-16 to the source of the contact according to the instructions in Section 3.12 for Normally Open or Normally Closed modes of operation. Connect terminal 3 of the first unit to terminal 3 on the additional UT-16s. Connect terminal 4 of the first unit to terminal 4 on the additional units.

Logic Mode: The logic input connections of up to six UT-16s can be bridged together (connected in parallel). Each logic input requires a minimum of 1mA of current for correct operation. A standard logic output source can provide at least 10mA. This is plenty of current to conservatively drive six UT-16s. Connect the logic input of the first UT-16 to the source according to the instructions in Section 3.12 for logic mode. Connect terminal 5 of the first unit to terminal 5 of the additional UT-16s. Repeat this process for terminal 6.

3.16 SECURING THE CONNECTING WIRES Use the cable ties provided in the installation kit to secure the 25-pair cables, along with any wires connected to the terminal strip, to the mounting points molded into the UT-16's base.

4. Testing and Operation

4.1 INSTALLATION REVIEW At this stage, the input and output circuits should be cross-connected with the UT-16. Power, transfer control line, and relay contact connections should be made. The mode and delay timer switches should be set.

4.2 STATUS LEDs The UT-16 contains two LED indicator lights. They are designed to provide assistance during installation, troubleshooting, and maintenance. The power LED is lit any time power is supplied to the unit. The transfer LED has three states: off, lit steadily, and flashing. The transfer LED lights steadily any time the unit is in the transfer mode while power is present. The transfer LED flashes when the contact or logic transfer control input has gone from the transfer to the normal state or power has returned to the unit after a power failure, and the delay timer is actively delaying the unit from returning the normal mode. Once the timing cycle has completed, the LED stops lighting.

4.3 EXPLANATION OF OPERATING MODES The UT-16 operates in two modes: normal and transfer.

Normal Mode: Normal mode operation commences when power is applied, the selected transfer control line is in its non-transfer state, the manual transfer switch is not activated and, if used, the delay timer has completed its time interval. In the normal mode only the power LED is lit.

Transfer Mode: Transfer mode is entered for any of three reasons: loss of power to the UT-16, a transfer request via the contact input or logic input, or activation of the manual transfer switch. When the UT-16 loses incoming power, the transfer mode is entered and neither LED is lit. When the transfer mode is entered due to a request via the contact input or logic input, or by pressing the manual transfer switch, the transfer LED will light and the power LED will remain lit. The transfer LED helps to differentiate a transfer caused by the loss of incoming power and a transfer caused by activating one of the transfer control lines or pressing the manual transfer switch.

4.4 TESTING THE UT-16 IN THE NORMALLY OPEN MODE In this section, we will test the UT-16 in an installation where the mode switch has been set to the NO position. This would be the case where the UT-16 is provided with a normally open (not shorted) contact that closes when transfer is requested.

Initial Operation: At this stage, the UT-16 should be in the normal mode, with only the power LED lit. If the transfer LED is lit or flashing, determine whether or not this is a problem. There are three reasons for the transfer mode being enabled. The first reason is legitimate: the contact input is closed (shorted), giving a command to transfer. The second reason is that the delay timer is active and the time interval has not completed. The transfer LED will be flashing whenever the delay timer is active. Reset the delay timer by pressing the manual transfer switch twice. The third reason is that the manual transfer switch is activated. Press it once to change its on/off state. After performing a review and making any required changes, the unit should be in the normal mode. Only the power LED should be lit.

Testing Transfer Operation: Momentarily disconnect the power source from the UT-16. The power LED should go out, indicating that the unit is in the transfer mode. Again apply power. The power LED should light. If the delay timer has been selected, the transfer LED will flash until the delay time has completed. Once the unit is in the normal mode, short the contact input at the source of the contact. The transfer LED should light. The power LED will remain lit when the transfer LED is lit. Remove the short and one of two things will happen. If the delay timer is not set, the transfer LED should immediately go out. If the timer is set, removing the short will start the delay timer and the transfer LED will flash until the timer has completed its cycle. If desired, the timer can be reset mid-cycle by pressing the manual transfer switch twice. This eliminates the need to wait for the entire cycle to finish.

4.5 TESTING THE UT-16 IN THE NORMALLY CLOSED MODE In this section, we will test the UT-16 in an installation where the mode switch has been set to the NC position. This is the case where the UT-16 is provided with a normally closed (shorted) contact that opens when transfer is requested.

Initial Operation: At this stage, the UT-16 should be in the normal mode, with only the power LED lit. If the transfer LED is lit or flashing, determine whether or not this is a problem. There are three reasons for the transfer mode being enabled. The first reason is legitimate: the contact input is open (not shorted), giving a command to transfer. The second reason is that the delay timer is active and the time interval has not completed. The transfer LED will be flashing whenever the delay timer is active. Reset the delay timer by pressing the manual transfer switch twice. The third reason is that the manual transfer switch is activated. Press it once to change its on/off state. After performing a review and making any required changes, the unit should be in the normal mode. Only the power LED should be lit.

Testing Transfer Operation: Momentarily disconnect the power source from the UT-16. The power LED should go out, indicating that the unit is in the transfer mode. Again apply power. The power LED should light. If the delay timer has been selected, the transfer LED will flash until the delay time has completed. Once the unit is in the normal mode, remove the short on the contact input at the source of the contact. The transfer LED should light. The power LED will remain lit when the transfer LED is lit. Reconnect the short and one of two things will happen. If the delay timer is not set, the transfer LED should immediately go out. If the timer is set, reconnecting the short will start the delay timer and the transfer LED will flash until the delay timer has completed its cycle. If desired, the delay timer can be reset mid-cycle by pressing the manual transfer switch twice. This eliminates the need to wait for the entire cycle to finish.

4.6 TESTING THE UT-16 IN THE LOGIC MODE In this section, we will test the UT-16 in an installation where the mode switch has been set to the LOGIC position. This is the case where the UT-16 is being provided with a normally high logic signal that changes to logic low when transfer is requested.

Initial Operation: At this stage, the UT-16 should be in the normal mode, with only the power LED lit. If the transfer LED is lit or flashing, determine whether or not this is a problem. There are three reasons for the transfer mode being enabled. The first reason is legitimate: the logic input has a logic low presented to it. The second reason is that the delay timer is active and the time interval has not completed. The transfer LED will be flashing whenever the delay timer is active. Reset

the delay timer by pressing the manual transfer switch twice. The third reason is that the manual transfer switch is activated. Press it once to change its on/off state. After performing a review and making any required changes, the unit should be in the normal mode. Only the power LED should be lit.

Testing Transfer Operation: Momentarily disconnect the power source from the UT-16. The power LED should go out, indicating that the unit is in the transfer mode. Again apply power. The power LED should light. If the delay timer has been selected, the transfer LED will flash until the delay time has completed. Once the unit is in the normal mode, disconnect the logic signal at the source of the signal. The transfer LED should light. The power LED will remain lit when the transfer LED is lit. Reconnect the logic signal and one of two things will happen. If the delay timer is not set, the transfer LED should immediately go out. If the timer is set, restoring the logic high signal will start the timer and the transfer LED will flash until the delay timer has completed its cycle. If desired, the timer can be reset mid-cycle by pressing the manual transfer switch twice. This eliminates the need to wait for the entire cycle to finish.

4.7 TESTING MULTIPLE UT-16s Use the following paragraphs to test a multiple UT-16 installation. Place all the UT-16s in the normal mode. Only the power LEDs should be lit. Press the manual transfer switch on the first UT-16. The transfer LED on this unit should light. Again, press the manual transfer switch on the first unit. The transfer LED should stop lighting. Repeat this sequence for all the UT-16s. Now refer to the section appropriate for your installation.

NO Mode: Previously, the contact input on each of the UT-16s should have been connected together, and then connected to a normally open contact. Short the contact at the source of the contact. The transfer LED on each of the UT-16s should light and the power LEDs will remain lit. Remove the short and one of two things will happen. If the delay timer is not set, the transfer LEDs should immediately go out. If the delay timer is set, removing the short will start the delay timers operating and the transfer LEDs will flash. As each timer completes its cycle, its associated transfer LED will stop lighting. If desired, a unit's delay timer can be reset in mid-cycle by pressing its manual transfer switch twice.

NC Mode: Previously, the contact input on all the UT-16s should have been connected together, and then connected to a normally closed contact. Disconnect the closure at its source. The transfer LED on each of the UT-16s should light and the power LEDs will remain lit. Reconnect the closure and one of two things will happen. If the delay timer is not set, the transfer LEDs should immediately go out. If the delay timer is set, reconnecting the short will start the delay timers operating and the transfer LEDs will start flashing. As each timer completes its cycle, its associated transfer LED will stop lighting. If desired, a unit's delay timer can be reset mid-cycle by pressing its manual transfer switch twice.

LOGIC Mode: Previously, the logic input on all the UT-16s should have been connected together, and then connected to a logic signal. Disconnect the logic signal at the source of the signal. The transfer LED on each of the UT-16s should light and the power LEDs will remain lit. Reconnect the logic signal and one of two things will happen. If the delay timer is not set, the transfer LEDs should immediately go out. If the delay timer is set, reconnecting logic high will start the delay timers operating and the transfer LEDs will start flashing. As each delay timer completes its cycle, its associated transfer LED will stop lighting. If desired, a unit's delay timer can be reset mid-cycle by pressing its manual transfer switch twice. This eliminates the need to wait for the entire cycle to finish.

4.8 TESTING THE TELEPHONE CIRCUITS ASSOCIATED WITH THE UT-16 The one or more UT-16 units that have been installed should each be tested by following the procedure outlined in this section. Place the UT-16 in the normal mode. The power LED should be lit. The transfer LED should not be lit. Ensure that each circuit associated with the UT-16 is routed to its intended point. Use the manual transfer switch to place the UT-16 in the transfer mode. Both LEDs should be lit. Ensure that each circuit is now connected to its intended point.

4.9 PLACING THE UT-16 INTO SERVICE The one or more UT-16s should now be ready for action! Normal operation should find the power LED lit, and the transfer LED not lit. Note that there is no reason why the UT-16 can't remain in the transfer mode indefinitely, going into the normal mode only as required. It is just as usual to have the unit primarily in the normal mode.

4.10 MAINTENANCE It is recommended that each UT-16 and associated equipment be tested not less than once a year.

5. Circuit Description

5.1 GENERAL The circuit description is intended to familiarize you with the UT-16 for engineering and applications use.

5.2 POWERING The UT-16 automatically adjusts for 24Vac, –24Vdc, or –48Vdc operation. Power enters the unit and passes through a full wave rectifier circuit. For 24Vac operation, this converts the AC to DC. For DC operation, this acts as a polarity guard. An electrolytic capacitor provides filtering. The rectified and filtered power is fed to a 3-terminal regulator which limits the voltage to –24Vdc. The –24Vdc provides power for the transfer relays and the power LED. The –24Vdc is also fed to a 3-terminal regulator which provides –12Vdc for use by the logic circuitry and the auxiliary relay.

5.3 LOGIC CIRCUITRY The UT-16 uses CMOS integrated circuits for low power, reliable operation. An oscillator provides a low frequency clock signal for use by the delay timer circuitry. DIP switches program a divider circuit for the desired time interval. Robust relay driver integrated circuits control the transfer and auxiliary relays.

5.4 TRANSFER CONTROL LINES The contact input is isolated from the outside world via a high impedance, TTL-type input. The logic input uses an optical coupler to maintain isolation from the device supplying the logic signal.

5.5 AUXILIARY RELAY CONTACT Auxiliary Relay Contact NO1 follows the operating mode of the UT-16, changing state any time the UT-16 is in the transfer mode.

6. Specifications

POWER REQUIREMENT
18 to 30Vac, 140mA maximum
–22 to –56Vdc, 130mA maximum

(For AC operation use Class 2 power transformer only, minimum 10VA rating)

TRANSFER VOLTAGE
Minimum voltage to go from normal mode to transfer mode: 8Vac, –10Vdc, approximate
Minimum voltage to go from transfer mode to normal mode: 10Vac, –18Vdc, approximate

NUMBER OF TWO-WIRE TRANSFER CIRCUITS
16

RETURN TO NORMAL MODE DELAY TIMER
Time Interval: One to 15 minutes, selectable in one-minute increments
Accuracy: ±10% of selected time interval

AUXILIARY RELAY CONTACT NO1
Type: normally open (not shorted), break before make
Rating: 0.5A maximum at 60Vdc or 60Vac (resistive)

TRANSFER CONTROL INPUTS
Contact Input: the contact connected to the contact input must be capable of handling 1mA at –24Vdc; contact inputs on multiple UT-16 units can be bridged (connected in parallel)
Logic Input: transfer is enabled by applying a logic low to the logic input. Minimum logic current for logic high: 1mA. Input current is limited via a 1800 ohm resistor in series with the logic input's optical coupler. If sufficient logic current is available, logic inputs on multiple UT-16 units can be bridged (connected in parallel).
Operating Modes: switch selectable for normally open contact input, normally closed contact input, or normally high logic input

ENVIRONMENT
0 to 50 degrees C, humidity to 95% (no condensation)

FCC REGISTRATION
Registration Number: BVV8VH-60403-PX-N
Ringer Equivalence: 0.0B

RADIATED NOISE COMPLIANCE
Contains no circuitry subject to EMI regulations

RELIABILITY
MTBF 33.3 years, per Method 1 of Bellcore TS-TSY-000332, Issue 3, September 1990

INTERCONNECTIONS
The UT-16 contains two 25-pair plugs and one 6-position screw terminal strip. Installer must supply two 25-pair connectors (female).

DIMENSIONS
8.75 inches high (22.2cm)
8.75 inches wide (22.2cm)
3.25 inches deep (8.3cm)

WEIGHT
Approximately 2 pounds (0.9kg)

MOUNTING
Wall mounts with four #8 pan head screws

7. Incorrect Operation

7.1 REVIEW PRACTICE Should problems arise in the operation of the UT-16, please review Section 3—Installation and Section 4—Testing and Operation of this practice.

7.2 INCORRECT MODE SELECTION If a logic source is not used, the mode switch must not be set to the LOGIC position. Leaving the UT-16 in the logic mode without a logic source will cause the unit to remain "locked" in the transfer mode. If the mode switch is set to the NC mode a closed (shorted) contact must be connected. Leaving the UT-16 in the NC mode without a shorted contact input will leave the unit locked in the transfer mode.

7.3 LOGIC INPUT POLARITY The logic input is polarity sensitive! Correct operation requires that the logic signal's + and – connections are correctly connected. Incorrectly connecting the logic signal to the UT-16 will result in the unit staying "locked" in the transfer mode.

7.4 RETURN TO NORMAL MODE DELAY TIMER This feature is wonderful but is rarely seen on telecommunications equipment. If you are having trouble getting the UT-16 to respond to your wishes, start by disabling the delay timer. Simply place the four DIP switches to the OFF position and the delay timer is no longer active. This will allow the UT-16 to be tested without the timer's intervention. Then, to familiarize yourself with the timer, set the time interval for one minute. This will allow you to observe the timer in action without going crazy waiting for a long time interval to complete! Once you are comfortable with what is going on, reset the timer to the desired interval. Remember that pressing the manual transfer switch twice will reset a timer cycle that is in process.

7.5 INCORRECT POWER CONNECTION Be sure that the power source is correctly connected to terminal strip TS1. As soon as power is applied, the power LED will light.

7.6 APPLICATION LIMITATIONS The UT-16 was designed to operate correctly in most transfer applications. However, Gordon Kapes, Inc. does not guarantee the UT-16 to be compatible with every specific application. All functions of the installed UT-16 should be thoroughly tested before the unit is placed into service.

7.7 SAVE TIME You are encouraged to call Gordon Kapes, Inc. for technical support. We much prefer a telephone call BEFORE you tear your hair out! We do not mind "walking" you through an installation, or performing a verbal review prior to your actually getting started. Please have these items with you: a copy of this technical practice, system configuration documentation, and adequate tools. In addition, it is very helpful to have a digital VOM, such as the wonderful Fluke 70 or 80 series, a lineperson's handset, and some cross-connect wire.

7.8 WE MAY BE IN OUR PAJAMAS, BUT... With advance notice, technical help is available from Gordon Kapes, Inc. beyond "normal" business hours. If you anticipate a long, tough installation, or can only work at a site during "off hours" don't worry! Call us a day or two ahead to arrange for someone to be available to help you.

8. Repair and Replacement

8.1 NOT SO FAST Statistically, most equipment returned to Gordon Kapes, Inc. for repair actually has nothing wrong with it. A telephone call to Gordon Kapes, Inc. technical support can often help to get the equipment operating correctly. We don't mind spending time with our customers getting a site up and running.

8.2 SEND IT BACK If you determine that the UT-16 is defective, return for repair or replacement according to the Gordon Kapes, Inc. Warranty/Repair and Return policy.

8.3 ONLY WE FIX IT In the event repairs are ever needed on your UT-16, they should only be performed by Gordon Kapes, Inc. or an authorized representative. For further information, contact Gordon Kapes, Inc.

9. United States FCC Notes

9.1 TYPE OF SERVICE Your UT-16 is designed to be used on standard device telephone lines. The UT-16 connects to telephone lines by means of standard jacks called USOC RJ21X. Connection to telephone company-provided coin service (central office implemented systems) is prohibited. Connection to party line service is subject to state tariffs. Connection to coin service party lines is not specified but could prove interesting.

9.2 TELEPHONE COMPANY PROCEDURES The goal of the telephone company is to provide you with the best service it can, within the constraints of receiving a good return on shareholder equity. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, possibly in advance, to allow you to make any changes necessary to maintain uninterrupted service. If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line; both of these items are listed on the equipment label. The sum of all of the RENs on your telephone line should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

9.3 IF PROBLEMS ARISE If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given an opportunity to correct the problem and be informed of your right to file a complaint with the FCC. You have the right to remain silent, if you waive your right to remain silent...

Specifications and information contained in this technical practice subject to change without notice.

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Figure 2 UT-16 Universal Transfer Unit Connection Diagram

P1 Pin Number	Cable Color	Connection	
26	WHT-BLU	T	In-1
1	BLU-WHT	R	
27	WHT-ORN	T	Out Normal-1
2	ORN-WHT	R	
28	WHT-GRN	T	Out Transfer-1
3	GRN-WHT	R	
29	WHT-BRN	T	In-2
4	BRN-WHT	R	
30	WHT-SLT	T	Out Normal-2
5	SLT-WHT	R	
31	RED-BLU	T	Out Transfer-2
6	BLU-RED	R	
32	RED-ORN	T	In-3
7	ORN-RED	R	
33	RED-GRN	T	Out Normal-3
8	GRN-RED	R	
34	RED-BRN	T	Out Transfer-3
9	BRN-RED	R	
35	RED-SLT	T	In-4
10	SLT-RED	R	
36	BLK-BLU	T	Out Normal-4
11	BLU-BLK	R	
37	BLK-ORN	T	Out Transfer-4
12	ORN-BLK	R	
38	BLK-GRN	T	In-5
13	GRN-BLK	R	
39	BLK-BRN	T	Out Normal-5
14	BRN-BLK	R	
40	BLK-SLT	T	Out Transfer-5
15	SLT-BLK	R	
41	YEL-BLU	T	In-6
16	BLU-YEL	R	
42	YEL-ORN	T	Out Normal-6
17	ORN-YEL	R	
43	YEL-GRN	T	Out Transfer-6
18	GRN-YEL	R	
44	YEL-BRN	T	In-7
19	BRN-YEL	R	
45	YEL-SLT	T	Out Normal-7
20	SLT-YEL	R	
46	VIO-BLU	T	Out Transfer-7
21	BLU-VIO	R	
47	VIO-ORN	T	In-8
22	ORN-VIO	R	
48	VIO-GRN	T	Out Normal-8
23	GRN-VIO	R	
49	VIO-BRN	T	Out Transfer-8
24	BRN-VIO	R	
50	VIO-SLT	NO1	Auxiliary Relay
25	SLT-VIO	NO1	Contact

P2 Pin Number	Cable Color	Connection	
26	WHT-BLU	T	In-9
1	BLU-WHT	R	
27	WHT-ORN	T	Out Normal-9
2	ORN-WHT	R	
28	WHT-GRN	T	Out Transfer-9
3	GRN-WHT	R	
29	WHT-BRN	T	In-10
4	BRN-WHT	R	
30	WHT-SLT	T	Out Normal-10
5	SLT-WHT	R	
31	RED-BLU	T	Out Transfer-10
6	BLU-RED	R	
32	RED-ORN	T	In-11
7	ORN-RED	R	
33	RED-GRN	T	Out Normal-11
8	GRN-RED	R	
34	RED-BRN	T	Out Transfer-11
9	BRN-RED	R	
35	RED-SLT	T	In-12
10	SLT-RED	R	
36	BLK-BLU	T	Out Normal-12
11	BLU-BLK	R	
37	BLK-ORN	T	Out Transfer-12
12	ORN-BLK	R	
38	BLK-GRN	T	In-13
13	GRN-BLK	R	
39	BLK-BRN	T	Out Normal-13
14	BRN-BLK	R	
40	BLK-SLT	T	Out Transfer-13
15	SLT-BLK	R	
41	YEL-BLU	T	In-14
16	BLU-YEL	R	
42	YEL-ORN	T	Out Normal-14
17	ORN-YEL	R	
43	YEL-GRN	T	Out Transfer-14
18	GRN-YEL	R	
44	YEL-BRN	T	In-15
19	BRN-YEL	R	
45	YEL-SLT	T	Out Normal-15
20	SLT-YEL	R	
46	VIO-BLU	T	Out Transfer-15
21	BLU-VIO	R	
47	VIO-ORN	T	In-16
22	ORN-VIO	R	
48	VIO-GRN	T	Out Normal-16
23	GRN-VIO	R	
49	VIO-BRN	T	Out Transfer-16
24	BRN-VIO	R	
50	VIO-SLT		
25	SLT-VIO		

Terminal Strip TS1

1	2	3	4	5	6
See Note 1		Contact Input		+	–
				Logic Input	

Note 1

TS1 Terminal Number	UT-16 w/24Vac Operation	UT-16 w/–24Vdc Operation	UT-16 w/–48Vdc Operation
1	AC Common	GND	GND
2	±24Vac	(power supply) –24Vdc	(power supply) –48Vdc

Note 2

NO Contact Input: Close (short) to place UT-16 in transfer mode.
NC Contact Input: Open (remove short) to place UT-16 in transfer mode.
Logic Input: Remove (1mA minimum) logic signal to activate transfer.

Note 3

NO1: Normally open (not shorted) auxiliary relay contact. Closes (shorts) when transfer occurs.