Technical Practice

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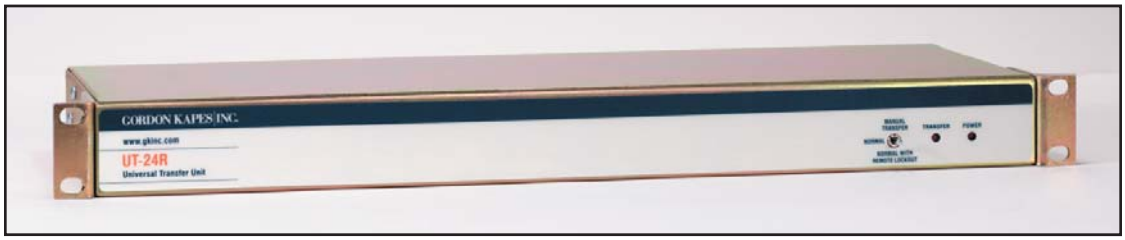
UT-24R Universal Transfer Unit



1. General Description

1.1 Product Overview

The UT-24R 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 24 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 origin of the UT-24R. Rugged, sealed electromechanical relay contacts are used to perform the switching functions. The contacts are highly reliable, rated for operations in the millions of cycles. A microcontroller integrated circuit provides the logic "smarts" for the unit. The UT-24R can be rack or wall mounted.

1.2 Features

UT-24R features include 24 circuits of transfer, LED status indicators, manual transfer switch, status relay contact, return to normal mode delay timer, and configurable operating modes. Also included are provisions for connecting a contact closure or logic level signal to control the UT-24's transfer mode. The compact self-contained unit is housed in a one-rack-space steel enclosure. Interconnections are made using standard 25-pair telephone-type plugs and an 8-position detachable terminal strip.

1.3 Power Requirements

The UT-24R can be powered with an external source of nominal 24 volt AC, –24 volt DC, or –48 volt DC. There are no switches to set or straps to cut. The UT-24R automatically adjusts for the power that is connected.

1.4 Physical Description

The UT-24R consists of a precision-fabricated printed circuit board mounted inside a rugged steel enclosure. The unit measures 19.00 inches (48.3 cm) wide, 1.72 inches (4.4 cm) high, 6.9 inches (15.3 cm) deep, and weighs approximately 4.7 pounds (2.1 kg). It can be mounted in one space (1.75-inches) of a standard 19-inch rack enclosure. Alternately, it can be wall mounted.

2. Applications

2.1 Primary Application

The UT-24R is intended to serve as a useful "building block" for special applications. Up to 24 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 signal paths.

2.2 Analog and Digital Telephone Circuits

A typical UT-24R application would be with two-wire analog or digital telephone circuits. These circuits could include loop or ground start trunks, OPX/OPS circuits, and DS1 data circuits. Because the UT-24R is configured to transfer 24 independent pairs, four- and six-wire E&M circuits, four-wire leased lines, and other special circuits can also be connected. Using the UT-24R, a power failure, contact closure, or logic signal could cause the rerouting of telephone circuits from primary equipment to on- or off-premise backup equipment.

2.3 Data Lines

Data lines that do not require special shielding can be switched by the UT-24R. A prime example would be with twisted pair Ethernet network cabling. A normal and emergency routing scenario could be created, with the UT-24R providing the switching.

2.4 A/B Switch

The UT-24R also can be considered as a giant A/B switch, with 48 individual inputs connecting to 48 normal and transfer outputs. It's a simple matter to connect low-voltage control signals and use the UT-24R to switch between normal and emergency equipment.

2.5 Contact and Logic Inputs

The UT-24R provides both a contact input and a logic input function. These inputs allow external signals to place the UT-24R in the transfer mode. With this capability, the UT-24R can be integrated 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 normally logic high or normally logic low signal.

2.6 Return to Normal Mode Delay Timer

A unique UT-24R function provides a time delay between when power is restored, or a transfer control line returns to its normal state, and when the 24 circuits return to their normal, non-transfer mode. The delay timer is configurable 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 or "rebooted" prior to the UT-24R returning to the normal mode.

2.7 Status Relay Contact

An isolated relay contact is available for installer-selected applications. The status relay contact is a normally open (not shorted) contact that closes (shorts) when the unit goes into the transfer mode. A configuration setting allows the exact operation of the relay contact to be determined.

2.8 Using Multiple UT-24R Units

Multiple UT-24Rs can be connected to provide more than 24 circuits of transfer. The contact and logic inputs are specifically designed to allow bridging (connecting in parallel).

2.9 Alternate Products

For smaller applications, Gordon Kapes, Inc. manufactures the UT-8 and the UT-16. Generally functionally identical to the UT-24R, those units provide eight and 16 circuits of transfer respectively. Refer to the Gordon Kapes, Inc. website for details.

3. Installation

3.1 Installation Overview

In this section you will be installing and interconnecting the UT-24R. The one-rack-space unit will be mounted in an equipment rack. Alternately, it can be mounted on a wall surface. Input and output connections will be made by way of three 25-pair connectors. Power and, if required, contact input, logic input, and relay contact output connections will be made using an 8-position screw terminal strip.

3.2 Caution

As with any product, installing the UT-24R requires a safety-first approach.

Warning: Never install telephone wiring during a lightning storm. 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.

3.3 Rack Mounting

In most cases the UT-24R will be mounted in a standard 19-inch (48.3 cm) equipment rack. One space (1.75 vertical inches) is required. Secure the UT-24R into the equipment rack using two mounting screws per side. These screws must be provided by the installer. Note that as the UT-24R generates little heat, multiple UT-24R units can be mounted on top of each other in adjacent rack spaces.

In its standard configuration the UT-24R's rack mounting brackets are attached to what's considered the front of the unit. This is the surface that contains the manual transfer switch and status LED indicator lights. The connectors and configuration switches are on the unit's back and would typically face the inside of the rack enclosure. In special cases it may be necessary for the connectors to face the front of a rack enclosure. This is easily accomplished by moving the rack mounting brackets to their alternate attachment points located toward the back of the unit. Two Phillips-head screws are used to secure each rack bracket to the alternate attachment points.

3.4 Wall Mounting

If an equipment rack is not available, the UT-24R can also be mounted to a wall surface. To accomplish this simply requires that the rack mounting brackets be removed from the sides of the enclosure then reattached in their rotated (90-degree) position. The installer must provide wall-mounting hardware that's appropriate for the selected mounting surface. It's recommended that this surface be a plywood "back board" with a minimum thickness of ¾-inch.

3.5 Connections

All connections to and from the UT-24R are made by way of three 25-pair plugs and an 8-position detachable screw terminal strip. The 25-pair plugs are used to interface with the designated telephone, data, or other low-voltage control signals. The installer must provide three cable assemblies with attached 25-pair cable-mounted female connectors to mate with the UT-24R's plugs.

3.6 Installing and Terminating the 25-Pair Connectors

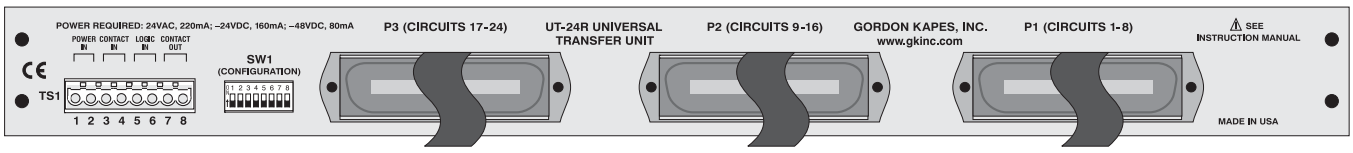
Install the three 25-pair cable-mounted connectors into plugs P1, P2, and P3 which are located on the UT-24R's back panel. Once they are firmly mated with the plugs they should be secured using the Velcro® fastener strap assemblies. Terminate the cable ends as required for the specific application. In most cases the cables will be "punched down" into 66-type or the newer and much-preferred 110-type blocks. For detailed connection information refer to the diagram located at the end of this practice.

3.7 Transfer Circuit Connections

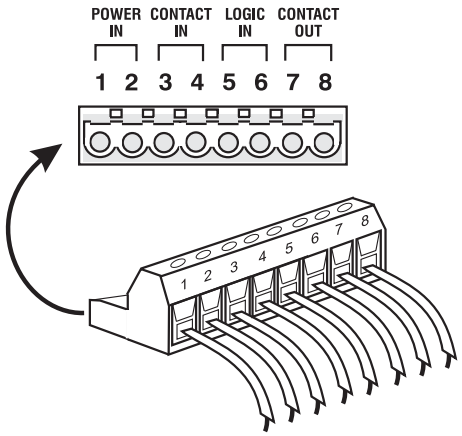
The UT-24R provides 24 independent two-wire transfer circuits. Each circuit provides six connections that are organized in telecom fashion as three "tip and ring" pairs. Referring to the diagram located at the end of this practice, cross-connect the telephone, or other selected cable pairs, with the designated inputs and outputs.

3.8 Operating Power

The UT-24R requires an external source of low-voltage AC or DC power for operation in its "normal" mode. This can be nominal 24 volt AC, –24 volt DC, or –48 volt DC. The UT-24R circuitry includes a high-efficiency switch-mode power supply that converts the connected power source to the necessary internal operating voltages. The



Back view of UT-24R



8-position detachable terminal strip

power source is connected to terminals 1 and 2 of the detachable screw terminal strip TS1. Prior to making connections it may be helpful to first remove the terminal strip from the back of the UT-24R.

Powering with 24 volts AC: When powering the UT-24R with 24 volts AC, it's recommended that both sides of the power source be floating (isolated) from earth ground. If the source is a plug-in-the-wall device it needs to be a Class 2 type. The 24 volt AC source must be able to provide a minimum of 220 milliamperes of current. A transformer with a rating of 10 VA or greater would be appropriate. Connect one lead of the 24 volt AC source to terminal 1 of the terminal strip. The other lead connects to terminal 2.

Powering with –24 volts DC: Connect power supply ground to terminal 1 of TS1; –24 volts DC to terminal 2. The power source must be capable of providing 160 milliamperes of current.

Powering with –48 Vdc: Connect power supply ground to terminal 1 of TS1; –48 volts DC to terminal 2. The power source must provide a minimum current of 80 milliamperes.

3.9 Contact Input

The contact input is designed to be connected to a variety of signals. Examples include a manual switch or a relay contact provided by remote control equipment. The signals can be either normally open or normally closed. A configuration setting, discussed in the next section of this document, selects the contact input mode. Signals compatible with the UT-24R's contact input can be in the form of an isolated relay contact or a contact that closes or opens in reference to ground. If your configuration provides an isolated 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. If your configuration provides a contact that is in reference to ground, connect the contact to terminal 3 of the terminal strip; connect ground to terminal 4. The contact inputs on multiple UT-24R units can be connected together ("bridged"), allowing one contact signal to control many UT-24R units.

3.10 Logic Input

The logic input allows a low-voltage DC current to control the UT-24R's operating mode. A signal of this type, typically current-limited 5 volts DC, is sometimes provided by a remote control system. The logic signal can be either normally high, (e.g., +5 volts), or normally low (0 volts). A configuration setting, discussed in the next section of this document, selects the logic input mode. Connect the positive (+) lead of the logic signal to pin 5 of the terminal strip. Connect the negative lead (–, common, or ground) to pin 6 of the terminal strip. The logic inputs on multiple UT-24R units can be connected ("bridged"), allowing one logic signal to control many UT-24R units. The limiting factor is that the source of the logic signal must be able to provide 2 milliamperes of current for each UT-24R logic input that is connected together. For example, five UT-24R units connected together would require 10 milliamperes of current for correct operation. Note that most logic signal sources can provide 10 milliamperes of current.

3.11 Status Relay Contact Output

The UT-24R provides a status relay contact output for site-specific applications. A switch setting, described in the next section of this document, allows the mode of the status relay contact to be configured. The status relay contact is isolated (not connected to any other signal) and is accessible on pins 7 and 8 of the terminal strip. The contact is rated for use with low-voltage, low-current AC and DC signals. Signals of up to 60 volts AC or DC, and 0.5 amperes of current can be safely connected.

4. Configuration

4.1 Configuration Overview

Eight switches are associated with DIP switch assembly SW1. The switches, referred to as SW1-1 through SW1-8, are used to configure a number of UT-24R operating modes. Reviewing how the switch settings impact the unit's performance is important. Then selecting the appropriate settings is crucial to obtaining correct performance from the overall installation.

4.2 Contact Input Mode

Switch SW1-1 selects the mode of the contact input function. In the off (down) position the contact input is in its normally open mode. The UT-24R's transfer mode will be entered when pins 3 and 4 of the terminal strip are connected together (shorted). When switch SW1-1 is in the on (up) position the contact is in its normally closed mode. The UT-24R's transfer mode will be entered when pins 3 and 4 of the terminal strip are open (not shorted). In almost all applications having SW1-1 in the off (down) position will be appropriate. Note that setting switch SW1-1 to the on (up) position without connecting an appropriate contact signal will cause the UT-24R to stay "locked" in the transfer mode.

4. 3 Logic Input Mode

Switch SW1-2 selects the mode of the logic input function. In the off (down) position the logic input is in its normally logic low mode. The UT-24R's transfer mode will be entered when a logic signal is present on pins 5 and 6 of the terminal strip. When SW1-2 is in the on (up) position the logic input is in its normally logic high mode. The transfer mode will be entered when a logic signal is not present on pins 5 and 6 of the terminal strip. In almost all applications having SW1-2 in the off (down) position will be appropriate. Note that setting switch SW1-2 to the on (up) position without connecting an appropriate logic signal will cause the UT-24R to stay "locked" in the transfer mode.

4.4 Status Relay Contact Mode

Switch SW1-3 selects the mode of the status relay contact. In the off (down) position the relay will close (short) whenever the UT-24R is in the transfer mode for any reason (pins 7 and 8). This includes using the manual transfer switch, located on the front panel. When SW1-3 is in the on (up) position the relay will close when the UT-24R is in the transfer mode due to loss of incoming power, a transfer signal from the connected contact input, or a transfer signal from the connected logic input. However, using the manual transfer switch to place the UT-24R in the transfer mode will **not** cause the status relay contact to close (short). This allows local testing of a UT-24R without alerting a device connected to the contact output. In summary, the differences between the two modes are fairly subtle so it's important to understand them!

4.5 Spare Switch Position

Switch SW1-4 is reserved for future use and can be set to either position. For clarity it's recommended that it be placed in the off (down) position.

4.6 Return to Normal Mode Delay Timer

The UT-24R can be configured for a time delay whose purpose is to allow a related piece of equipment to completely reset prior to the UT-24R 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 UT-24R after a power interruption. Only after the timer has gone through a complete cycle will the 24 circuits return to the normal mode. The delay timer is configurable over a time period of one to 15 minutes in one-minute increments. Switches SW1-5 through SW1-8 are used to set the time interval. When all four switches are in the off (down) position the delay timer is not active. Placing any of the switches in their on (up) position selects the desired time delay.

Switch	Function
SW1-5	ON adds 1 minute
SW1-6	ON adds 2 minutes
SW1-7	ON adds 4 minutes
SW1-8	ON adds 8 minutes

All switches OFF disables the delay timer function.

5. Testing and Operation

5.1 Installation Review

At this stage, the signals associated with the transfer circuits should be cross-connected with the UT-24R. Power and, if required, contact input, logic input, and contact output connections should have been made. The configuration switches should have been set as required.

5.2 Status LEDs

The UT-24R contains two LED indicator lights. Both red in color, they are intended to provide assistance during installation, troubleshooting, and maintenance procedures. The power LED is lit any time an external source of power is connected to the UT-24R. The transfer LED has three states: off, lit steadily, and "flash." The transfer LED will not be lit when the UT-24R is in the normal, non-transfer mode. The transfer LED will light steadily any time the unit is in the transfer mode and an external source of power is present. The transfer LED will flash on and off when the UT-24R is prevented from returning to the normal mode due to the delay timer being active. This would occur when the contact input or logic input has gone from the transfer to the normal state or the external power source has returned after a power failure has occurred. Once the delay time has completed, the LED will stop lighting and the unit will return to its normal mode.

5.3 Explanation Of Operating Modes

The UT-24R operates in two modes: normal and transfer.

Normal Mode: Normal mode operation commences when an external power source is applied, the contact and logic inputs are in their non-transfer states, 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. In the normal mode the input pairs associated with each of the 24 transfer circuits is connected to its associated normal output pair.

Transfer Mode: Transfer mode is entered for any of three reasons: loss of the external power source connected to the UT-24R, a transfer request via the contact or logic input, or activation of the manual transfer switch. When the UT-24R loses its source of incoming power, the transfer mode is entered and neither LED is lit. When the transfer mode is entered due to a request from the contact input or the logic input 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 the contact or logic inputs. The transfer mode can also be entered by moving the front-panel manual transfer switch to its manual transfer (up) position. The transfer LED will also light when this takes place.

5.4 Testing the Contact Input

In this section, we will test the UT-24R in an installation where the contact input is utilized. In this example a normally open contact has been connected and SW1-1 has been set to its off (down) position.

Initial Operation: At this stage, the UT-24R should be in the normal mode, with only the power LED lit. If the transfer LED is lit (steadily 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 flash whenever the delay timer is active. Reset the delay timer by moving the manual transfer switch, located on the front panel, to its down (normal with remote lockout) position. Then move it back to its center (normal) position. The third reason is that the manual transfer switch is in its up (manual transfer) position. Move it back to the center (normal) position. 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-24R. 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 (close) the contact input at the source of the contact. The transfer LED should light steadily. The power LED should remain 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 moving the manual transfer switch to its down position, then back to its center position. This eliminates the need to wait for the entire cycle to finish.

If desired, the delay timer can be reset mid-cycle by moving the manual transfer switch to its down (normal with remote lockout) position. Then move it back to its center (normal) position. This eliminates the need to wait for the entire cycle to finish.

5.5 Testing the UT-24R in the Logic Mode

In this section, we will test the UT-24R in an installation where a logic signal has been connected to the logic input. In this example the UT-24R 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-24R should be in the normal mode, with only the power LED lit. If the transfer LED is lit (steady 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 flash whenever the delay timer is active. Reset the delay timer using the manual transfer switch by moving it to its down position, then back to the center. The third reason is that the manual transfer switch is activated. Move the switch to its center position. 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 external power source from the UT-24R. 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 moving the manual transfer switch to its down position, then back to its center position. This eliminates the need to wait for the entire cycle to finish.

5.6 Testing the Functions Associated with the Transfer Circuits

The one or more UT-24R units that have been installed should each be tested by following the procedure outlined in this section. Place the UT-24R 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-24R is routed to its intended point. Use the manual transfer switch to place the UT-24R in the transfer mode. Both LEDs should be lit. Ensure that each circuit is now connected to its intended point.

5.7 Placing the UT-24R into Service

The one or more UT-24Rs 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-24R can't remain in the transfer mode indefinitely, going into the normal mode only as required.

5.8 Maintenance

It is recommended that each UT-24R and associated equipment be tested not less than once a year.

6. Incorrect Operation

6.1 Review Practice

Should problems arise in the operation of the UT-24R, begin troubleshooting by reviewing Section 3–Installation and Section 5–Testing and Operation of this practice.

6.2 Incorrect Contact Input Configuration

If a normally closed (shorted) signal is not connected to the contact input terminals, switch SW1-1 must be set to the off (down) position. If the switch is set to the on (up) position and an open (not shorted) condition is present on the contact input the UT-24R will remain "locked" in the transfer mode.

6.3 Incorrect Logic Input Configuration

If a normally high, e.g., +5 volt, source of logic current is not connected to the logic input terminals, switch SW1-2 must be set to the off (down) position. If the switch is set to the on (up) position and no current is flowing through the logic input, the UT-24R will remain "locked" in the transfer mode.

6.4 Return to Normal Mode Delay Timer

The delay timer feature can be very useful but is, as far as we've seen, unique to the UT-24R. If you are having trouble getting the UT-24R to respond to your wishes, start by disabling this feature. Simply place switches SW1-5 through SW1-8 to the off (down) position and the delay timer will be disabled. This will allow the UT-24R to be tested without the timer's intervention. To familiarize yourself with the delay timer, you might want to set the time interval for one minute. To do this requires placing SW1-5 to the on (up) position. 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 configuration switches to the desired time interval. Remember that moving the manual transfer switch from the center position to the down position, and then back to the center position will reset a timer cycle that is in process. The switch is located on the front panel to the left of the status LEDs.

6.5 Application Limitations

The UT-24R was designed to operate correctly in many telecom, data, and general-purpose transfer applications. However, Gordon Kapes, Inc. does not guarantee the UT-24R to be compatible with every specific application. All functions of the installed UT-24R should be thoroughly tested before the unit is placed into service.

6.6 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 you actually getting started. Please have these items with you: a copy of this technical practice, system configuration documentation, and adequate tools, including a digital multi-meter and associated test cables.

6.7 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.

7. Repair and Replacement

7.1 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.

7.2 Only We Fix It

In the event repairs are ever needed on your UT-24R, they should only be performed by Gordon Kapes, Inc. For further information or to have a return authorization number issued, contact Gordon Kapes, Inc.

8. Specifications

Transfer Circuits: 24, 2-wire ("tip and ring") pairs

Arrangement: each circuit has three pairs (six leads) associated with it: an input pair, a normal pair, and a transfer pair

Switching Method: sealed bi-furcated electromechanical relays, break-before-make

Contact Rating: 0.5 amperes maximum, 60 volts AC or DC (resistive)

Contact Input:

Compatibility: connected contact must be capable of handling 5 milliamperes at 40 volts DC; contact inputs on multiple UT-24R units can be bridged (connected in parallel)

Operating Modes: switch selectable for normally open (not shorted) or normally closed (shorted)

Logic Input:

Compatibility: connected signal must provide minimum logic high current of 2 milliamperes. Logic input current is limited via a 1000 ohm resistor in series with the logic input's optical coupler. If sufficient logic current is available, logic inputs on multiple UT-24R units can be bridged (connected in parallel).

Operating Modes: switch selectable for normally high logic ("+5 volts") or normally logic low ("0 volts")

Return to Normal Delay Timer:

Time Interval: One to 15 minutes, selectable in one-minute increments

Accuracy: ±1%, nominal, of selected time interval

Status Relay Contact Output:

Type: normally open (not shorted)

Contact Rating: 0.5 amperes maximum at 60 volts AC or DC (resistive)

Interconnections:

Transfer Circuits: three 25-pair plugs (male). Installer must supply three 25-pair connectors (female).

Power, Contact Input, Logic Input, and Status Relay: pluggable terminal strip, 0.2-inch (5.08 mm) contact centers

Mating Connector (included with UT-24R): PCD Connector part number ELFP08210

Power Requirement:

24 volts AC, nominal, 220 milliamperes maximum
–24 volts DC, nominal, 160 milliamperes maximum
–48 volts DC, nominal, 80 milliamperes maximum

Acceptable range for above voltages –10/+15%. For AC operation use Class 2 power transformer only, minimum 10 VA rating

Dimensions:

19.00 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
6.9 inches deep (15.3 cm)

Mounting: one space of a 19-inch rack or to a wall surface

Weight: 4.7 pounds (2.1 kg)

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

UT-24R Universal Transfer Unit Connection Diagram

P1 (Circuits 1-8)

Pin No.	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		
25	SLT-VIO		

P2 (Circuits 9-16)

Pin No.	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		

P3 (Circuits 17-24)

Pin No.	Cable Color	Connection	
26	WHT-BLU	T	In-17
1	BLU-WHT	R	
27	WHT-ORN	T	Out Normal-17
2	ORN-WHT	R	
28	WHT-GRN	T	Out Transfer-17
3	GRN-WHT	R	
29	WHT-BRN	T	In-18
4	BRN-WHT	R	
30	WHT-SLT	T	Out Normal-18
5	SLT-WHT	R	
31	RED-BLU	T	Out Transfer-18
6	BLU-RED	R	
32	RED-ORN	T	In-19
7	ORN-RED	R	
33	RED-GRN	T	Out Normal-19
8	GRN-RED	R	
34	RED-BRN	T	Out Transfer-19
9	BRN-RED	R	
35	RED-SLT	T	In-20
10	SLT-RED	R	
36	BLK-BLU	T	Out Normal-20
11	BLU-BLK	R	
37	BLK-ORN	T	Out Transfer-20
12	ORN-BLK	R	
38	BLK-GRN	T	In-21
13	GRN-BLK	R	
39	BLK-BRN	T	Out Normal-21
14	BRN-BLK	R	
40	BLK-SLT	T	Out Transfer-21
15	SLT-BLK	R	
41	YEL-BLU	T	In-22
16	BLU-YEL	R	
42	YEL-ORN	T	Out Normal-22
17	ORN-YEL	R	
43	YEL-GRN	T	Out Transfer-22
18	GRN-YEL	R	
44	YEL-BRN	T	In-23
19	BRN-YEL	R	
45	YEL-SLT	T	Out Normal-23
20	SLT-YEL	R	
46	VIO-BLU	T	Out Transfer-23
21	BLU-VIO	R	
47	VIO-ORN	T	In-24
22	ORN-VIO	R	
48	VIO-GRN	T	Out Normal-24
23	GRN-VIO	R	
49	VIO-BRN	T	Out Transfer-24
24	BRN-VIO	R	
50	VIO-SLT		
25	SLT-VIO		