KELLY SYSTEMS CASH SECURE PNEUMATIC TUBE SYSTEM

Division 14 - Conveying Systems
Pneumatic Tube Systems - Section 14580

PART 1 - GENERAL

1.1 SUMMARY

A. This section of the specification includes the design, furnishing and installation of a complete KellyTube Cash Secure Pneumatic Tube System, as specified herein and shown on the drawings including supervision of field wiring associated with the work of this section.

B. The System(s) specified herein shall be complete and shall not require any additional support equipment or utilities other than electrical.

C. All work of this section shall be performed in accordance with the contract documents.

1.2 SYSTEM DESCRIPTION

A. The KellyTube Cash Secure Pneumatic Tube System shall be 2.25", 3", 4", 6", 8" and 4"x7" oval (as required). Aluminum single tube vacuum/pressure type, as manufactured by Kelly Systems, Inc. of Chicago, IL and shall provide dedicated service between designated stations. Stations shall be located in the following areas as shown on the drawings, with service as follows:

VAULT/CASH ROOM TO AND FROM

B. Carrier transmission is accomplished by a central power unit which shifts between vacuum and pressure operating modes. The central power unit shall be free-standing type which is located in the Vault/Cash Room or can also be located remote from the central station.

C. The System is designed for operation only while a carrier is in transit between stations, and when carriers have been queued for dispatch, all controlled by the PC computer. The System is designed to transport one carrier per operating cycle at an average speed of 25 feet per second.

D. To dispatch a Carrier from a Sub Station, open the Station Door and place the Carrier on the Station Pad. Depress the Send Pushbutton, then close and latch the Station Door. Vacuum will then propel the carrier to the Central Vault Station, after which the system will automatically turn off. If the System is in use when a dispatch is desired, the Cashier

may still initiate a transaction as described above, and the System Computer will automatically dispatch the Carrier when the current transaction has completed.

E. To dispatch a Carrier from the Central Vault/Cash Station, open the Vault/Cash Station Door and place the Carrier on the Station Pad. Close and latch the terminal door, select the desired Sub Station from the destination menu on the Computer Monitor using the arrow keys, then press Enter. The Power Unit will dispatch the Carrier on pressure to the Sub Station and will then automatically turn off. The Real-Time details of the transaction are displayed on the Computer Monitor and are fully viewable by Vault Personnel during the transaction.

F. All Sub Stations are down-delivery full-access type, complete with reinforced polycarbonate door. The Doors are hinged and reinforced with a metal frame. All Sub Stations are key lockable and have an integral Send Pushbutton and Indicator Lights. Sub Stations can be wall, floor or counter mounted, and must maintain a clean appearance throughout.

G. The Kelly Systems Cash Secure Pneumatic Tube System is fully expandable with the addition of Diverters and Stations without requiring modification or replacement of existing equipment or control software.

1.3 SYSTEM SOFTWARE DESIGN

A. The Control Software and System Features were designed based on the specific requirements for secure cash handling and monitoring. To this end, the System was specifically designed with an easy to use computer with a full color 15 inch monitor and keyboard. This provides a very understandable, menu driven operator interface, as well as, allowing for easy programming changes as needed or requested.

B. With a full 15 inch display Monitor in plain English, the display incorporates user hints of how to use the system, shows real time progress of transactions, and provides audible and bright color visual displays of system and user errors with instructions on how to correct these faults. (If the customer chooses to provide phone or internet connection to the P.C. then remote diagnostics and maintenance are possible.)

C. A large Usage History with time and date stamp and transaction details is incorporated in the Software. Due to the sometimes critical nature of transaction details, the Software automatically stores and maintains full information for the last 10,000 transactions. This Transaction History can be displayable on the screen or output to a printer and can be set to print any selectable Transaction range.

D. The System will queue transaction requests from all Sub Stations. When the System is busy with a current transaction, a Sub Station or multiple Sub Stations may still initiate their own transactions which the Software will monitor. As a transaction completes, the Software will automatically begin the next transaction, initiating each queue in the sequence in which they were entered. Due to the importance of Vault/Cash Room transactions, the Vault/Cash Room may interrupt the queued sequence with a priority

dispatch. When the Vault/Cash transaction is completed, the queued Carrier dispatches automatically resume.

E. A clock programmable System Purge is supplied to send any Carriers inadvertently left in Sub Stations at closing time to the Vault/Cash Room Safe. Vault/Cash Room personnel can set the time they want this function performed (e.g. 1:00 AM) or may disable this function at their discretion.

F. The System Software also provides for a quick transition from the Day Mode to the Night Mode. When Vault/Cash Room personnel are present, the System is normally in a Day Mode which allows for Sending Carriers to the Sub Stations and Recieving carriers in the accessible Vault Station. When Vault Room personnel are not present, the System can be switched to protective Night Mode with the press of a button on the Keyboard. Carriers from the Sub Stations will then deliver into a locked Vault. A Password is then required to switch back to Day Mode which must be entered on the keyboard. This keeps unauthorized personnel from switching the Sytem from a protected Night Mode to Day Mode. A clock programmable Night Vault/Cash mode is incorporated in the Software to automatically switch the System to Night Mode at a predetermined time, in the event the last Vault/Casy personnel for the day forgets to do so.

G. A Carrier Present feature is included so that the Vault/Cash Personnel can easily see which Sub Stations have carriers present in them. This is helpful when a money till is called for, but not promptly removed from the Sub Station. The Vault/Cash personnel can see this and make a judgement as to whether to retreive this back to the Vault/Cash Room. The Retrieve function is controlled at the Vault/Cash Room so calling out to the Sub Station is unnecessary. This feature is also useful if the Vault/Cash innadvertently sends a carrier to the wrong Sub Station.

H. All Send/Receive Stations are equipped with non-contact highly reliable optical sensors. Thru beam infrared optics are highly reliable eliminating problems associated with mechanical contact switches.

I. All Send/Receive Stations are equipped with Key-Lockable Doors. This, together with the high strength polycarbonate doors allow visual recognition of a carriers presence, while affording strong theft protection.

J. Sub Stations can easily be disabled through the Software so that carriers can not be inadvertently or deliberately sent to inactive Sub Stations. Thru the menu driven configuration, the Vault/Cash Room can easily turn off a station that is not being used. This function is password protected.

K. The Software provides Purging of Stations or the entire System to check for Carriers. The System Maintenance Menu allows the Vault/Cash Room to Purge any Station individually, or all Stations sequentially. Either type of Purge can be cancelled at anytime. Station Purges can be done in either vacuum or pressure modes.

L. System diagnostics and maintenance are provided to insure all System equipment is operating properly. The System Maintenance Menu allows Vault/Cash personnel to

position and operate Diverters, Blower, Air Shifter and Vault Shifter directly from the keyboard. These maintenance features are invaluable in serving maintenance needs over the phone. Diverters can also be moved with vacuum applied to clear Carriers that may get caught in Diverters. Again, these features are operated from the keyboard in the Vault/Cash Room.

a. All electrical components are connected with industry standard RJ45 networking for quick and easy connection of components. The data runs on U.S.standard 485 protocol. The System uses distributed 24 volt power so there is no need for 120 volt power supplied anywhere except in the Vault/Cash Room.

N. The System Software keeps track of transaction timing cycles. If a carrier is not delivered to a Sub Station or the Vault/Cash Station in the requisite time, the System will automatically apply more time and begin looking for the Carrier and any System errors. If the Carrier still does not reach its destination, an error alert will be displayed and an audible alarm will sound in the Vault/Cash Room. An error specific message will be displayed with error correction options for clearing the error. These messages are all displayed in clear, easy to understand English.

1.4 MATERIALS AND INSTALLATION

A. Tubing and Bends shall be specially manufactured for pneumatic carrier transmission, fabricated of heavy-duty, chemically washed 2.25", 3", 4", 6", 8" and 4"x7" oval (as required). 16 gauge continuous welded Aluminum, manufactured to ASTM-B313 and ANSI H35.1 standards, H-26 tempered for maximum resistance to oxidation and corrosion for indoor or outdoor installation. Aluminum Tubing and Bends shall be chemically treated for non-static properties.

B. Each 20 ft. full straight length of tubing shall have one expanded end for pressure-fit joints. Tubing shall be securely held in place, and shall be braced against any motion caused by the passage of carriers. Bends shall be formed on the centerline to a minimum 36" radius, commensurate with carrier type and size and shall be of a true circular cross section throughout, and free from wrinkles or distortions.

C. Field cut tubing and bends shall be joined with tamper-resistant galvanized electric welded steel pressure fit couplings of proper dimensions to produce an air tight connection. When bends are cut in the field for offsets and small angle turns, the ends shall be cut square and straightened out by mandrilling to make a smooth connection to the adjoining piece. Sub Stations and Diverters shall be connected to Tubing using mechanical bolted couplings for ease of replacement and maintenance.

D. All pressure joints shall be sealed with a high strength, medium viscosity aluminum colored, synthetic rubber based industrial metal sealant to insure airtight connections throughout. Mechanical joints shall be sealed with high strength air-tight tape prior to installation of the Coupling.

E. Fittings shall be fabricated steel with the inside milled to fit snugly on the Tubing. Provide necessary elbows, tees, coupling sleeves, and other fittings required for proper installation of the systems.

F. Tubing and Bends shall be installed and secured with zinc plated double rod clamps constructed of 1" x 1/8" cold rolled flat bar steel held together by (2) 5/16" diameter threaded, zinc plated hanger rods. Single Rod minerallac type hangers may also be used when Tubing is supported close to bar joists. Clamps shall be spaced on not greater than 10 foot centers, and shall not have scoring or break joints to weaken their cross sectional area. Sway bracing shall be used at the top of each Sub Station riser, at each Diverter and elsewhere as required to prevent movement from the passage of carriers.

1.5 STATION TERMINALS

A. The Sub Stations shall be send/receive type constructed of heavy-duty 14 gauge furniture steel with a washable, wear resistant, protective powder coat finish. An impact-absorbing pad shall be built into each terminal to cushion the carrier's delivery.

B. Sub Station Doors shall be impact resistant transparent polycarbonate material and shall be 1/4" thick minimum. The transparent doors shall visually indicate the presence of carriers. All doors shall be equipped with a heavy-duty powder coated steel frame, positive action pull-tight lockable latch, and spring loaded hinge.

C. Delivery-control air diodes shall be provided at each station terminal location to insure an air-cushioned soft delivery of carriers. The air diodes shall be designed to open when sending a carrier to allow for free flow of air, and close when receiving a carrier to check air flow.

D. All Sub Stations shall be provided with low voltage Class 2 control wiring meeting NEC Article 725 standards. 24 volt "Send" and "In-Use" illuminated indicating lights shall be provided which illuminate whenever a carrier is in transit. A second illuminated pilot shall be provided at each station terminal that shall illuminate to indicate the arrival of a carrier. Removal of the carrier will extinguish the arrival light. All components will be mounted on a PC Board with R546 connector for easy serviceability. A thru beam infrared optic will signal carrier presence to the System Software.

E. The Vault/Cash Station shall be of the same construction, materials and design as the Sub Station, with the addition of a industrial duty positive locking handle.

1.6 CENTRAL POWER UNIT

A. The Central power unit shall be free standing type and can be located in or remote from the Vault/Cash Room. The central power units shall consist of one blower, air shifting mechanism and control panel.

B. One three phase blower shall be supplied that operates on 208/230/460 volt AC 60 Hz three phase power for increased efficiency and economy. The Blower shall be in the off mode except when System is in use. Blower shall be designed to move sufficient volume

of air at vacuum/pressure required to propel a loaded carrier (2.5 lb. payload capacity) through a 1200' system at an average speed of approximately 25 feet per second. Blower shall have a heavy-duty, air-tight, double chamber, aluminum enclosure. Blower shall be fully enclosed TEFC with vibration isolators. The blower shall always run in the same direction and never reverse.

C. The air shifting mechanism shall consist of a vertically mounted diverter unit complete with rotary motor. Air shifting mechanism shall alternate between four (4) positions to allow for vacuum neutral or pressure throughout the system, as appropriate to propel the carrier to its proper destination. When the gate is in position 1, the system will operate on pressure and when in position 2, the system will operate on vacuum without reversing rotation of the blower. The air shifting mechanism shall be electrically controlled by the System Software and shall automatically adjust to the proper position.

D. The control panel shall consist of a modular relay mounted on an enclosed printed circuit board for ease of maintenance. The relay shall be capable of individual removal and replacement, without the need to replace an entire controller.

1.7 DIVERTERS

A. All required Station Diverters shall be one-in, four-outlet type, wired for 24 VDC.
All diverters shall be housed in a metal framed enclosure and be motor driven. The diverters shall be provided with (1) full length secured access panel to facilitate maintenance in the field. Electrical relays contained in the diverter units shall be modular type for ease of maintenance. Tubing within the diverters shall be rigid. Offset tubing within the diverters shall be formed of clear polycarbonate for visual inspection of carrier blockages with bend radius sufficient to allow unobstructed carrier passage in either direction through the diverter. No flexible tubing shall be used.

B. Each diverter shall be provided with mounting flanges with appropriate holes to properly accept 3/8" diameter threaded, zinc plated hanger rods, for direct support and bracing. Trapeze type hanging arrangements shall not be allowed unless the diverter is directly bolted to the trapeze.

1.8 CARRIERS

A. Provide a minimum of three (3) carriers per Sub Station. Carriers shall be Kelly Dura-Built end-opening type, having an inside diameter of not less than 3", and shall be available in usable inside lengths ranging from 8" to 12". Carrier bodies shall be transparent polycarbonate material, with durable molded polypropylene end cups - one closed end, and one open end fitted with polyurethane strap-hinged rubber cover and elastic tab fastener to hold cover securely closed. End cups shall be fitted with replaceable wear bands sized to provide an air seal and to sound-deaden carrier travel through the Tubing.

1.9 SUBMITTALS

A. Submit complete shop drawings for the design of the system. Submit manufacturer's product data and installation instructions for each component of the system. Highlight specific areas in the product literature that demonstrate conformance of the proposed products with the System Description.

B. Submit operation and maintenance manual data for the entire system.

(2) sets of instruction manuals shall be furnished to the owner's representative with each set to include the following:

1.Thorough installation, operation, and maintenance and trouble-shooting instructions.

2. Phone assistance numbers.

1.10 QUALITY ASSURANCE

A. Provide products of a single manufacturer for the entire installation. Modifications of the tube systems shall be accomplished with Kelly Systems' standards and the approved modification procedures.

B. Manufacturer and installer shall have been engaged in the production and installation of similar type and size systems for at least ten (10) years with at least five (5) installations of the same equipment specified. Submit a list of projects assuring this qualification with bid.

C. System Contractor shall regularly and presently manufacture and install pneumatic tube systems as its principal business.

1.11 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials to the job site in original, new and unopened packages bearing the manufacturer's name, label, product number, etc.

1.12 WARRANTY

A. Provide a written warranty, signed by the manufacturer, agreeing to repair or replace all work that exhibits defects in material or workmanship. Normal wear and tear is excluded.

1.13 EXAMINATION

A. Prior to the installation of system components, inspect conditions at the site to assure that installation may proceed without interference of the work of other trades. Bring any

conflicts to the attention of the General Contractor for resolution. Beginning of installation implies acceptance of conditions.

1.14 CLEANING AND ADJUSTING

A. Remove all installation debris from the site. Clean all surfaces to be finished by others. Touch up all primers and finishes that have become scratched or blemished during installation.

B. Adjust pneumatic tube system to assure smooth operation.

C. Demonstrate system to available store personnel.

1.15 ELECTRICAL WORK

A. Electrical equipment specified herein shall be provided complete with motors, control panels, pushbuttons, and 24 v.a.c. interstation wiring. Plug-in type modular components shall be supplied with printed circuit boards for easy replacement. (Electrical power wiring to be performed by others).

1.16 STRUCTURAL WORK

A. Alterations to building components, machinery and equipment, cutting and repair of floors, walls, ceiling and roof openings, access panels, and the removal and replacement of the ceiling shall be provided by others.

1.17 TESTING, INSTRUCTION, TRAINING

A. The system shall be operated at a maximum design capacity for the duration of time as needed and repeated as necessary to prove to the owner's representative that the system meets design conditions and is acceptable for full operation. Allow two hours for on-site training and demonstration.