

TELETICKETING SERVICES
LOW SPEED DATA PHONE

IDENTIFICATION, OPERATION, INSTALLATION AND MAINTENANCE

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1. GENERAL

1.01 This section describes how to identify, operate, install, and maintain teleticketing (low speed *DATA PHONE*) services.

2. IDENTIFICATION

2.01 Teleticketing service is used primarily by transportation organizations for transmitting tickets to their customers over the regular telephone network at a maximum speed of 75 words per minute (wpm).

2.02 Station arrangements consist of 28-type teletypewriters (TTY) equipped with 130-type subscriber sets, telephone sets, and control equipment. The ticket office uses a send arrangement and their customers a receive only arrangement.

2.03 Two send arrangements are available:

- 28 KSR with an associated transmitter-distributor. This arrangement is covered by the TP581.000 Teletypewriter Coding Plans M-5100, A-5000, and W-5100. (See Exhibits 1 and 2.)
- 28 ASR Typing Reperforator. Covered by plans M-5050, A-5000, and W-5050. (See Exhibits 3 and 4.)

2.04 The receive arrangement uses a 28RO covered by plans M-5000, A-5000, and W-5000. (See Exhibit 5.)

2.05 Each station is equipped with a 500 D3 telephone set and TP 163796AB telephone shelf. Two special keys are incorporated into the teletypewriter base to select telephone or TTY operation.

2.06 A 130C1 Subscriber Set, 2W Line Coil Unit, Terminal and Control Parts are mounted in the lower portion of each TTY

console. Send arrangements are equipped with a 453E network and a TP 163806 Set of Parts (control). Receive arrangements use a 454E network and a TP 163805 Set of Parts (control).

2.07 The TP 163805 and 163806 Control Set of Parts consists of a TP 165021 relay, TP 163795 repeat coil, TP 164503 rectifier, other circuit components and receptacles, cables, etc., for connection to the 130C1 subset and TTY.

3. OPERATION

3.01 The telephone sets associated with the send and receive stations are connected to their respective telephone lines in the *on-hook* condition and are ready to originate or receive calls. (See Part 5.)

3.02 Establish connection between the two stations in exactly the same manner as for any telephone call. After connection is established and both parties agree to transfer to TTY operation, use the following procedure:

- (a) The sending party momentarily operates the (red) TTY push-button located on the keyboard. This operation activates the send station control equipment via the 130C1 subset. A steady tone of 1300 cps is transmitted to the telephone line.
- (b) When the receive party hears the tone in the telephone receiver, he operates his TTY push-button momentarily. This action transfers the receive station control equipment to the TTY mode.
- (c) Both stations are now ready for teletype communication. The send party should allow a few seconds delay before starting transmission since he has no way of knowing when the receive party is ready.
- (d) Under normal operation both the sending and receiving station attendants should place their telephone handsets *on-hook* after switching to the TTY mode.

Note: If voice communication is required after the TTY transmission is completed, the handsets must be left *off-hook*.

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(e) Normally, a disconnect code (**FIGS H**) is transmitted at the end of the TTY message. This turns off the equipment at both ends and restores the telephone sets to the line. If the telephone sets are *on-hook*, the line is released; if not, voice communication can resume.

(f) In case of an emergency or trouble condition, either party can turn off his equipment by operating the (black) **TEL** push-button. This button performs the same function as the disconnect code and can be used for this purpose when the code is not sent.

Note: The receiving station cannot stop transmission by a "*break*" or any other method. By pushing the **TEL** key and going *on-hook*, they simply restore the receive equipment to normal.

3.03 Off-line tape preparation is provided for in the 28 ASR arrangement. To prepare tape, operate the power switch to **ON** and select the proper keyboard control switch setting.

- **KEYBOARD** - "**K**" position Provides hard copy and printed tape copy of keyboard or TD transmission (electrically coupled).
- **TAPE** - "**T**" position Provides printed tape copy of keyboard selections (mechanically coupled).
- **KEYBOARD and TAPE** - "**KT**" position This position of the switch should not be used without additional control equipment. (Reperforator is mechanically coupled to the keyboard and electrically coupled to the transmitting circuit.)

3.04 The send station attendant may use a transmitter stop code (**FIGS F**) in the preparation of a message tape to stop the transmitter at any prearranged location. When the code is transmitted, the **TD** stops and remains idle until the **START** button is depressed. This allows for the keyboard insertion of additional information in the body of the text. When the send station is on line, this feature is disabled.

Note: The transmitter stop code must be followed by letters (**LTRS**) or figures (**FIGS**) combination. (The length of time equivalent to one teletype character is required to stop the transmitter.)

3.05 The 28 KSR - TD arrangement can be used off-line by operating the power switch to **ON**. Tape preparation facilities are not available in this arrangement.

4. CIRCUIT DESCRIPTION

Sending Stations

4.01 Normal condition of the station is idle. Motors are off, telephone is *on-hook*, all relays are released.

4.02 To place a call, attendant listens for dial tone and, if present, dials number of terminating station. No action takes place at the station.

4.03 When the receiving party answers and it is mutually agreed to transfer to TTY operation, the sending party operates the (red) **TTY** key (non-locking). This operates the **TB** relay.

4.04 The **TB** relay operated:

- (a) Locks operated through **TB 1M**, **TEL** key and **FIGS H** contacts.
- (b) **TB 2M** places a short across the **UCF** contacts thereby disabling them.
- (c) Transfers the telephone line from the telephone set to the 130C1 subset via **TB 3 & 5** and the repeat coil.
- (d) Operates the motor control relay via **TB 4M**. Motor starts.
- (e) Holds the reperforator magnets blinded through **TB 6M** and **12M**.
- (f) **TB 10M** completes a circuit through the sending contacts, printer magnets, and the 130C1 subset terminals 5 and 20.
- (g) **TB 6M** completes a circuit through the busy lamp and the lamp lights.

4.05 At this point, a steady marking tone is transmitted to the receiving station. When this tone is heard at the receiving station, operate the **TTY** key. The **TTY** is ready to receive signals. At the send station, after a few seconds delay, depress the **TD START** key, thus, operating the Line Shunt (**LS**) relay.

4.06 The **LS** relay operated:

- (a) Locks under control of its own contacts and the **FIGS H** contacts.
- (b) Completes a circuit through the **TD** clutch magnets. The magnet operates and transmission starts.

4.07 At the end of transmission:

- (a) With **FIGS H**:
 - (1) **UCH** contacts open.
 - (2) **TB** and **TD** relays release.
 - (3) Clutch magnets release.

- (4) Motor turns off.
- (5) Busy lamp goes out.
- (6) Telephone set is restored to the line. If *off-hook*, the line is held. If *on-hook*, the line is released.

(b) Depression of the TEL (normally closed) push-button:

- (1) Releases the *TB* relay.
- (2) Motor turns off.
- (3) Restores line to telephone operation.

Receiving Stations

4.08 Normal condition of the station is idle. Motors are off; telephone is *on-hook*.

4.09 When TTY operation has been agreed to, and the sending station has started transmission of the 1300 cycle tone, the attendant depresses the (red) TTY push-button. The resulting sequence of operation occurs.

4.10 The *TA* relay operates:

- (a) Locks operated through *TA 1M*, *TEL* key, and *FIGS H* contacts.
- (b) Transfers the telephone line from the telephone set to the repeat coil via *TA 3* and *5*.
- (c) Operates the motor control relay via *TA 4*.
- (d) The receiving station equipment is now ready for TTY operation. The receive only typing unit is under control of sending station until *FIGS H* is received.

4.11 The receiving equipment responds to *FIGS H* in the same manner as the sending equipment in that the *TA* relay releases, releasing the motor control relay and releasing the TTY from the line.

4.12 If for some reason it is desired to remove the *REC* only set from the line, it is necessary to depress the (black) *TEL* push-button. This will restore the equipment to idle line condition. The *TEL* push-button will not be operated under normal conditions.

5. INSTALLATION AND TESTS

5.01 The following test equipment is required:

- KS-14510, List-1, Volt-Ohm-Milliammeter or equivalent.

5.02 *Sending Station*. (See 3752WD, 3753WD, 3775WD, and 3776WD.)

(1) Verify that the correct filter has been installed in the 43A1 terminal. A 453E send network is required. No receive network is required in this terminal.

(2) Verify that vacuum tubes, V1 (407A) and V2 (407A), are in the correct sockets (others are not required).

(3) Verify that the *GRD* switch is in the *OFF* position.

(4) Verify that the *CARR IND* switch is in the *OFF* position.

(5) Verify that all cord connectors are securely connected.

(6) Connect power cord to 115-volt AC 3-wire outlet.

(a) Observe that all the tube filaments light on the 43A1 terminal.

(b) Allow 10 to 15 minutes for warm-up of 130C1 subset.

(7) Operate the power switch of the:

(a) Transmitter-distributor (KSR installations) to the *ON* position and observe the motor does not start.

(b) KSR (or ASR) to the *ON* position and observe that the motor runs satisfactorily. Shut motor off.

(8) Momentarily operate the *TTY* push-button and observe that the motor(s) runs satisfactorily and the busy lamp lights.

Note: Leave the unit(s) in this condition for the following tests.

(9) Connect the KS-14510 meter (120 MA scale) or KS-14234 VOM in series with lead on terminal 5 of the 130C1 subset.

(a) Verify that the *LP DC* loop current is .0625 amperes.

(b) Adjust the *SEND LP* control, located on the 130C1 subset, for .0625 amperes, if necessary.

(c) Verify that the *SB* control, located on the 130C1 subset, is in the extreme clockwise position.

Note: This is for .0625 A operation only. For .020 A operation, *ADJ* to best signal.

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(d) Verify that the receiving bias tolerance margin on the typing unit from both the keyboard and the Trans-Dist. are within the standard requirements for a local circuit, plus the range scale at the optimum setting.

Note: ASR machines are send only. Receive bias is not used.

(e) Verify that the **SEND** switch, located on the 43A1 terminal, is in the **HM** position.

(f) Verify that the **OSC** switch, located on the 43A1 terminal, is in the **ON** position.

(10) With the KS-14510 meter connected to pin jack test points:

(a) **SA** and **G**, located on the 43A1 terminal, measure the AC voltage and adjust the **SEND LEVEL** control for a reading of 1.54 volts using 3-V AC scale. This will give a -8 db signal into the cable pair.

Note: Record this reading on the reference chart. (See Chart A.)

(b) **MD** and **C**, located on the 43A1 terminal, measure the DC voltage and record on the reference chart. (Disconnect the KS-14510 meter.)

(11) Momentarily operate the **TEL** push-button. Observe that the motor(s) stops and busy lamp goes out.

(12) In ASR stations, operate the power switch to the **ON** position. Observe that the motor starts and the busy lamp does not light.

(13) Observe that both tape and hard copy can be made from the keyboard in the "K" position of **K-KT-T** switch.

(14) The ASR is now ready for off-line service.

(15) Turn off the motor, using the power switch.

(16) Connect the telephone line to terminals C1 and C2, and the telephone receiver to terminals C3 and C4 of the **KSR** (or **ASR**) console. Connect the signal ground lead to the console grounding screw.

(17) Make standard transmission and bell tests on the telephone set.

(18) Make a test call to the testing station.

(19) Verify test message contents for errors at both the sending and receiving stations.

(20) This station should now be ready for service.

5.03 *Receiving Station.* (See 3754WD and 3775WD.)

(1) Verify that the correct filter has been installed in the 43A1 terminal. A 454E receive network is required. No send network is required in this terminal.

(2) Remove vacuum tube V1 (407A) if it has been provided.

(3) Verify that the remaining vacuum tubes are in the correct sockets, V2 and V3 (407A), V4 (408A), and V5 (429A).

(4) Verify that all cord connectors are securely connected.

(5) Verify that the **REC** switch located on 43A1 terminal is in the **H+** position.

(6) Verify that the **GRD** switch is in the **OFF** position.

(7) Verify that the **CARR IND** switch is in the **OFF** position.

(8) Connect power cord to 115-volt AC 3-wire outlet.

(a) Observe that all the tube filaments light on the 43A1 terminal.

(b) Allow 10 to 15 minutes for warm-up of the 130C1 subset.

(9) Operate the power switch of the typing unit to the **ON** position and observe that the motor runs satisfactorily. Then operate to the **OFF** position.

(10) Momentarily operate the **TTY** push-button. Observe that the typing unit motor runs and the busy lamp lights.

Note: The TTY must be left in this condition for the following tests.

(11) Connect the KS-14510 meter (120 MA scale) or KS-14234 VOM in series with the lead on terminal 4 of the 130C1 subset. Adjust the **LOOP CUR** control for .030 amperes, if necessary.

Note: This is a preliminary adjustment. Final adjustment will be completed in (18).

(12) Connect the KS-14510 meter (300-V DC scale) or KS-14234 VOM. To pin jack test points **LP** and **C**, located on the 43A1 terminal, measure the DC voltage. Adjust the **REC LP** control, located on the 130C1 subset, for 80 volts, if necessary.

(13) Verify that the **REC GAIN** control, located on the 43A1 terminal, is in the extreme clockwise position.

(14) Momentarily operate the (black) **TEL** push-button. Verify that the motor stops and the busy lamp goes out.

(15) Connect the telephone line to terminals C1 and C2 of the TTY cabinet and the ground lead to the grounding screw for the cabinet. Connect the telephone receiver to terminals C3 and C4 of the TTY cabinet and the ground lead to the grounding screw for the cabinet.

(16) Make a test call to the testing station and request the testing station attendant to provide a steady marking tone of 1300 cps. Leave the equipment in this condition for the following tests.

Note: If a separate telephone is available, it may be of some help to establish a separate talking connection to the sending station to facilitate the performance of these tests.

(17) Recheck the TTY loop current as described in (11) and readjust (if necessary) for .030 ampere.

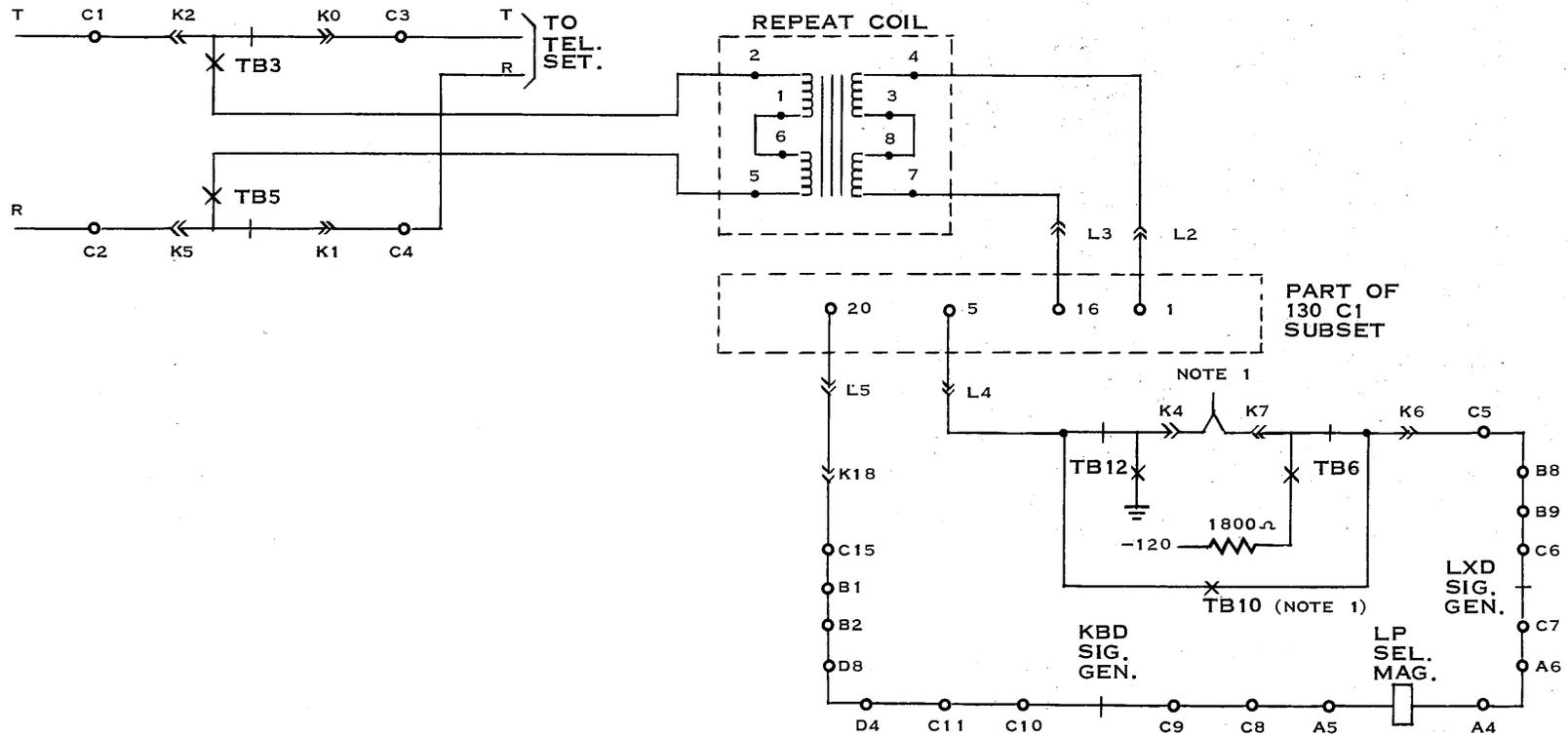
(18) Recheck the voltage reading between pin jack test points **LP** and **C** as described in (12); readjust (if necessary) for 80 volts.

(19) Repeat steps (16) and (17) until the required readings of 80 volts and .030 amperes are obtained simultaneously. Enter these readings on the reference chart. (See Chart B.)

(20) Request the testing station to send steady marking tone (if 164C TMS is used, request testing station to send **FOX** test signals). Using 164C TMS, adjust **REC BIAS** control for best signal when set on **PEAK** distortion.

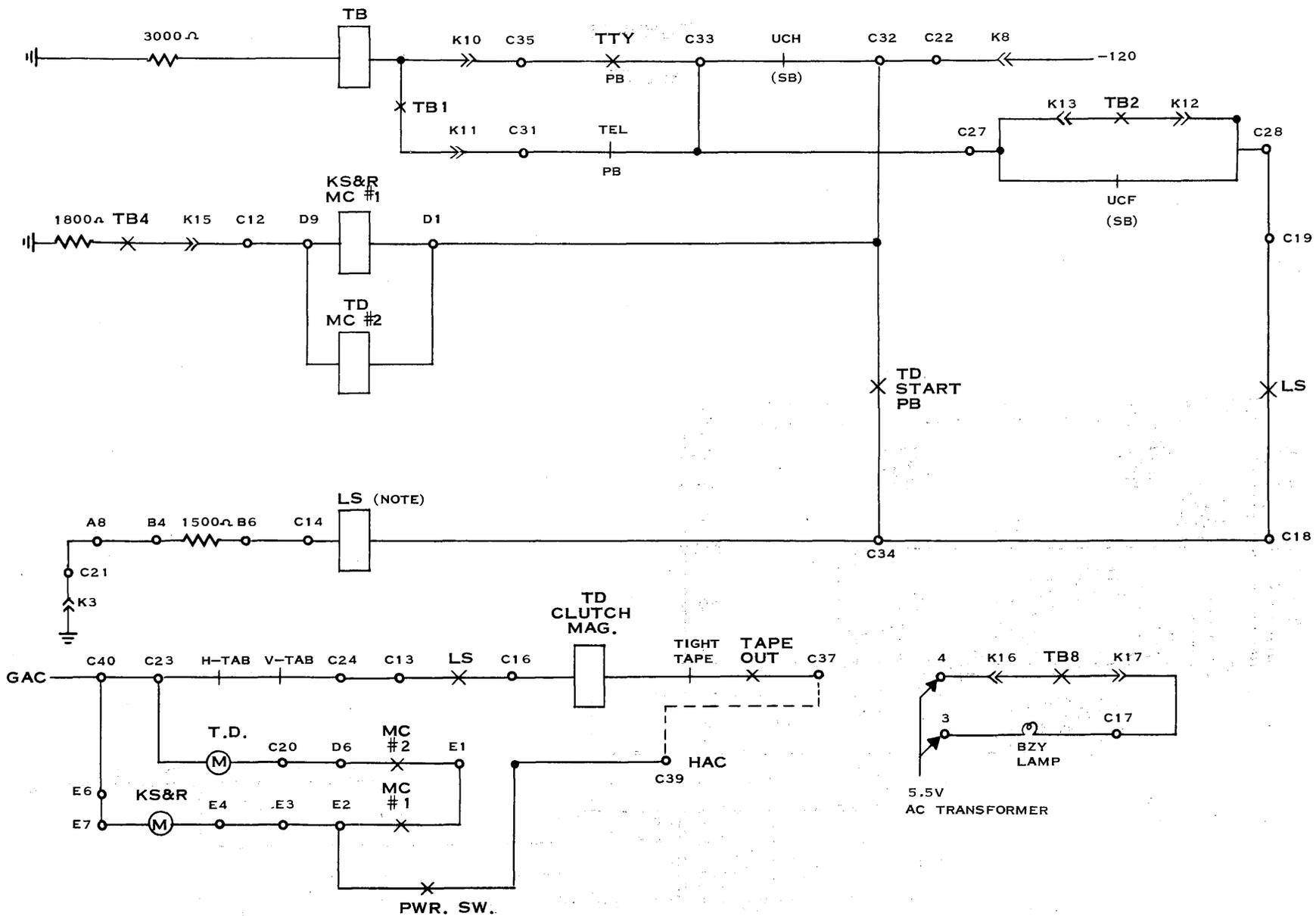
(21) Request the testing station attendant to transmit a test ticket. Examine the ticket for errors.

(22) This station is now ready for service.



NOTE 1 - WHEN ROTR IS NOT USED,
 a) K CONNECTOR, PINS K4 AND K7 (BL & W LEADS) ARE CONNECTED TOGETHER, SOLDERED, AND TAPED.
 b) TB10 IS NOT CONNECTED TO TB6 AND TB12.

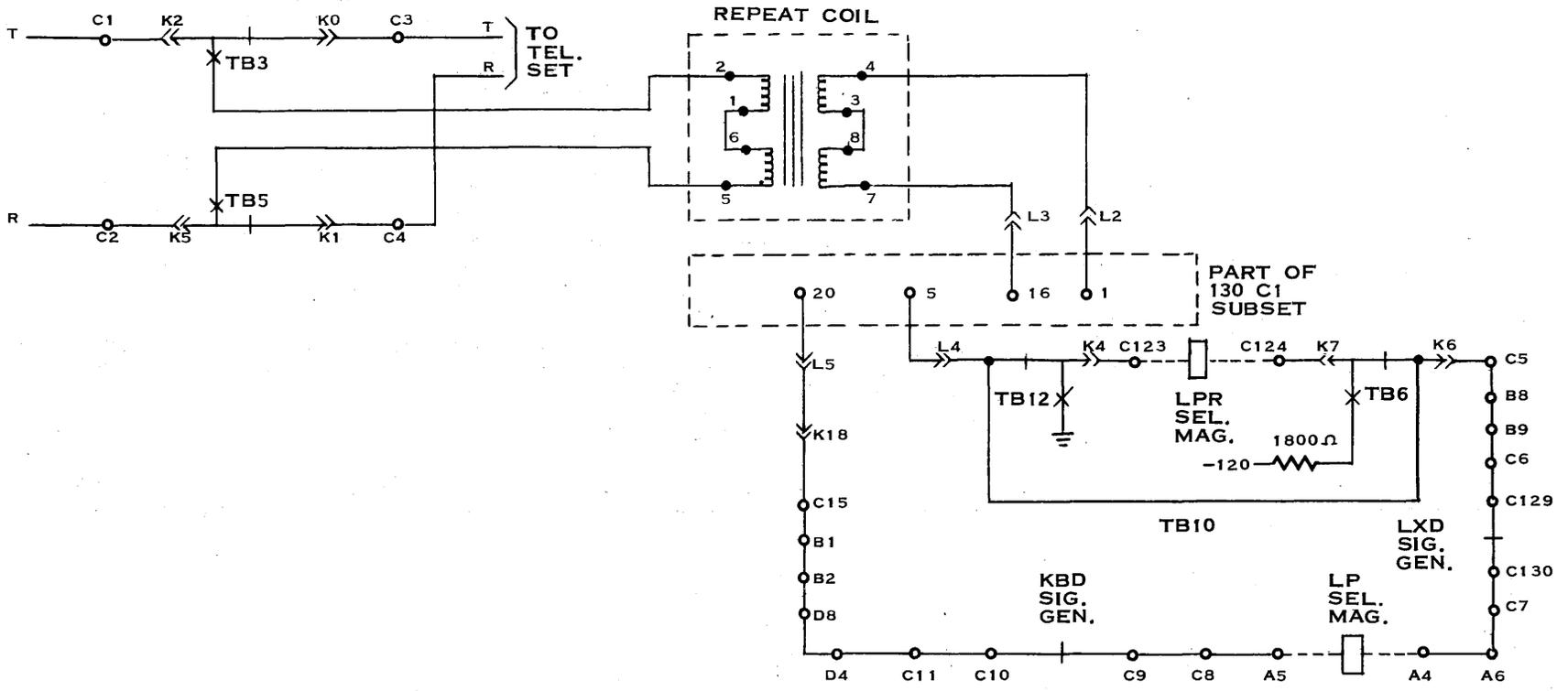
28 KSR
 EXHIBIT 1



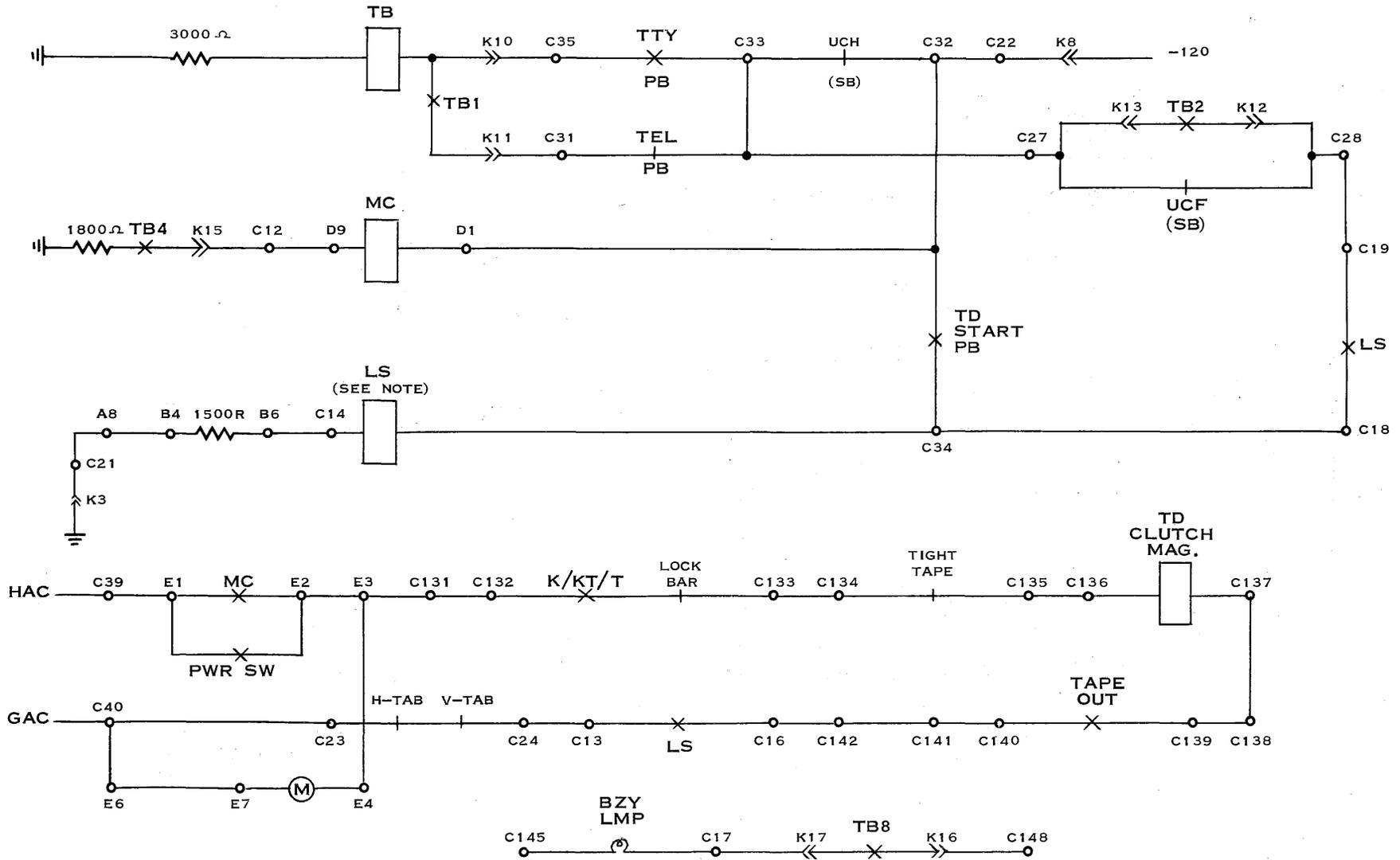
NOTE: LINE SHUNT RELAY IS USED FOR T.D. CONTROL.

28 KSR-28 TD ARRANGEMENT

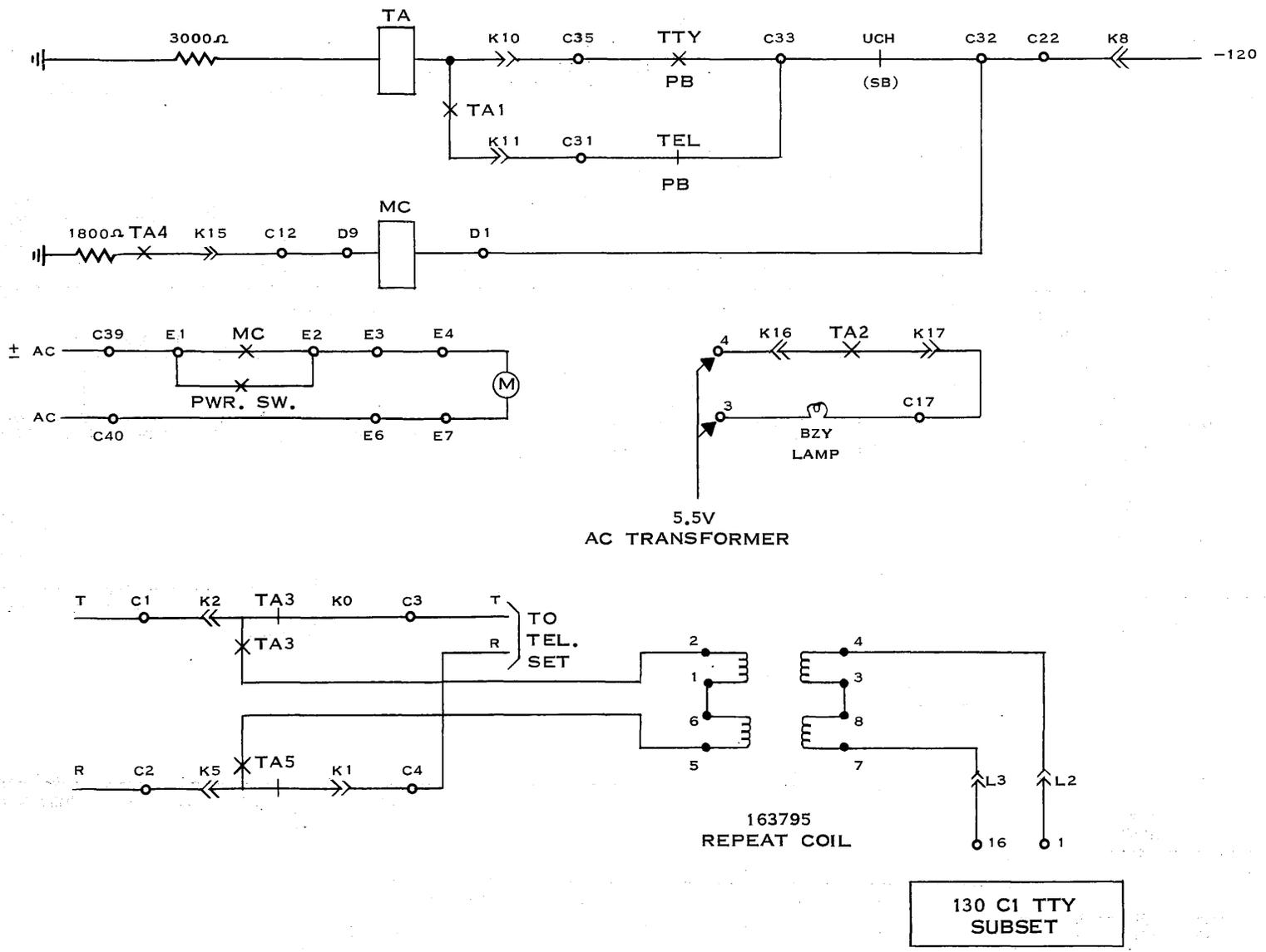
EXHIBIT 2



28 ASR
EXHIBIT 3



NOTE: LINE SHUNT RELAY IS USED FOR TD CONTROL.



28R0
EXHIBIT 5

CHART A
SENDING STATION ROUTINE CHART

TO MEASURE	REFERENCE PAR. 5.02	KS-14510 METER SCALE VOLTS	TEST POINT	REQUIREMENT	INITIAL INSTALLATION READINGS	SUBSEQUENT READINGS	
						DATE / /	DATE / /
130 VOLT POWER SUPPLY		300V DC	(-14) (+28) 130C1 SUBSET	130 ± 2 VOLTS			
20 VOLT POWER SUPPLY		60V AC	(15) (29) 130C1 SUBSET	20 VOLTS (APPROX.)			
LOOP CURRENT	(8)	120 MA	(5) 130C1 SUBSET	APPROX. .0625 MA			
SENDING CARRIER LEVEL	(9)(F)	3V AC	SA TO G 43A1 TERM.	1.54 V			
SEND CONTROL TUBE PLATE	(10)	300V DC	MD TO C 43A1 TERM.	90 TO 100 VOLTS			

CHART B
RECEIVING STATION
ROUTINE REFERENCE CHART

TO MEASURE	REFERENCE PAR. 5.03	KS-14510 METER SCALE VOLTS	TEST POINT	REQUIREMENT	INITIAL INSTALL.	DATE / / READING	DATE / / READING	DATE / / READING
130 VOLT POWER SUPPLY		300V DC	(-14) (+28) 130C1 SUBSET	130± 2 VOLTS				
20 VOLT POWER SUPPLY		60V AC	(15) (29) 130C1 SUBSET	20 VOLTS (APPROX.)				
LOOP CURRENT	(11)	120 MA	(4) 130C1 SUBSET	.030A				
PLATE-CATHODE VOLTAGE OF REC. OUT. TUBE	(12)	300V DC	LP TO C 43A1 TERM.	80 V				
DISCRIMINATOR RECTIFIER OUTPUT		60V DC 60V DC	D TO C (MARK) D TO C (SPACE)	46 VOLTS 48 VOLTS				