KS-21250, L2

COIN CRAFTS' TEST SET

1. GENERAL

- 1.01 This section provides identification, operation, and maintenance for the KS-21250, L2 Coin Crafts' Test Set (Fig. 1).
- 1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.
- 1.03 The KS-21250, L2 test set is a portable, self-contained test set for use in testing coin telephone components and the interaction between the coin telephone set and the central office (CO).

2. IDENTIFICATION

- 2.01 The KS-21250, L2 test set is housed in a metal case approximately 8-1/4 inches wide, 6-1/2 inches high, 7 inches deep, and weighs about 5 pounds. It has a hinged cover and a carrying strap. The test set is powered by twelve 1-1/2 volt AA batteries (not furnished with set).
- 2.02 The features of the test set are as follows:
 - (a) Hinged cover with spot-welded brackets for coiling test cord, fastening test clips, storing instruction booklet, and restoring power switch to OFF position when cover is closed. The hinged cover may also be removed for easy positioning of test set while working.
 - (b) W4CN four-conductor test cord to connect test set to coin telephone set with color coded insulators on test clips.
 - (c) Three square headed terminals marked RING, TIP, and GND for bridging of craft hand test set.
 - (d) Power off/on switch.

- (e) Battery check switch and associated light emitting diode (LED) for visual test of batteries.
- (f) Coin relay operate switch and associated neon indicator lamp for field testing of coin relay.
- (g) Coin relay battery off/on switch to provide battery for the coin relay operate and timing circuit.
- (h) Coin return-coin relay timing/coin collect (CR-TIME/CC) switch for testing the operation and timing of the coin relay.
- Fast and slow LEDs as visual indicators of coin relay timing test.
- (j) Loop battery off/on switch for providing local battery to test coin telephone set independent of CO.
- (k) -48/+48 switch for reversing local loop battery to simulate normal CO or positive CO battery condition.
- (l) Normal/sample hold switch provides opportunity to display sequence signals from CO in normal sequence timing (approximately 1/2 second) or sample and hold display of signals for approximately 4-1/2 seconds.
- (m) Seven LEDs for visual indication of (CO generated) sequence tests, loop battery, polarity tests, and loop current and foreign EMF tests.
- (n) 23MA detector switch for making loop current test.
- (o) Loop margin off/on switch for introducing 10-percent loop loss when testing marginal loop battery conditions.

NOTICE

Not for use or disclosure outside the Bell System except under written agreement



Fig. 1—KS-21250, L2 Coin Crafts' Test Set

- (p) Coin control margin off/on switch for introducing 10-percent loss in coin control loop when testing marginal coin loop conditions.
- (q) HT1 receiver unit controlled by loop battery key, used for monitoring coin tones, TOUCH-TONE® dial signals, and transmission from coin telephone handset.
- (r) An easy access battery compartment with captive single-turn screw lock and latching battery holder that slides in and out of battery compartment on a track for ease of battery replacement.
- (s) Single battery pack power source.
- (t) Automatic shut-off when batteries are too low.
- (u) Convenient easy to use controls.
- (v) Adjustable carrying strap of webbed material with snap-on clasps for carrying test set.
- (w) Two test set hangar swivels to suspend test set on the front of 1- and 2-type telephone sets.
- 2.03 The KS-21250, L2 coin test set does not come equipped with batteries. The batteries must be provided by the craft. The test set uses twelve 1-1/2 volt AA batteries.
- 2.04 The set of instruction cards supplied with the test set are intended as a guide only. If more detailed instructions are needed, refer to this section or Section 506-900-503.

3. OPERATION

- 3.01 The KS-21250, L2 test set has three general classes of test procedures:
 - (a) CO source, loop and external wiring of coin telephone set.
 - (b) Interaction between coin telephone and CO line.
 - (c) Coin telephone testing and timing independent of CO line.



If the fast or slow LEDs come on when test set power is turned on, they will reset when the Coin Return Battery switch is turned ON and OFF.

- 3.02 To perform CO source, loop and external wiring tests, remove cover of coin telephone set, install P11C patch cord, or hang cover on KS-20950, L2 cover parking tool, swivel hangars around to suspend test set from telephone set and proceed as follows:
 - (1) **23MA** Test—The 23MA current detector circuit simulates a 350-ohm load to the CO and will light a LED indicating when a current of 23MA or greater is flowing in the loop. This represents a worst case telephone set resistance which could be encountered in the field.



Bullet (•) at beginning of line indicates normal response or test OK to preceding step.

- (a) All off/on switches in off position.
- (b) Connect test set leads to TB-1 of coin telephone set per Fig. 2:
- -48V LED lights.
- (c) With coin telephone handset on-hook, depress and hold 23MA DETECTOR switch:
- 23MA LED lights.
- (2) Loop Margin Test—The loop margin test checks the ring and tip loop from the CO by shunting 10 percent of the available current away from the coin telephone set. This in effect extends the loop by 10 percent. If the circuit fails the loop margin test, it indicates a borderline loop resistance condition and the telephone set may experience erratic troubles or failures.
 - (a) All OFF/ON switches in OFF position except POWER switch.
 - (b) Connect test set leads per Fig. 2 and take coin telephone handset off-hook:
 - -48V LED lights.

- (c) Connect 1013-type hand test set (with switch in monitor position) to ring and tip test terminals (square headed terminals in lower left corner of test set).
- (d) Set LOOP MARGIN switch to ON.
- (e) Deposit 35 cents in coin chute and observe tones on 1013 hand test set.
- (f) If no tones are heard, turn LOOP MARGIN switch OFF, deposit 35 cents, and observe tones.
- (g) If tones still are not heard, consult test desk for loop and ground measurements.
- (h) If tones are heard and coin control problems are known to exist, the test desk should be consulted for loop and ground measurements.
- (i) Hang up coin telephone handset:
- · Coins should return.
- (i) Set LOOP MARGIN switch to OFF.
- (3) Coin Control Margin Test—The coin control margin test checks for marginal conditions on the tip to ground coin control path. A failure on this test indicates a borderline circuit resistance and the telephone set may experience erratic trouble or failures.
 - (a) All OFF/ON switches in OFF position except POWER switch.
 - (b) Connect test set leads per Fig. 2 and take telephone handset off-hook:
 - -48V LED lights.
 - (c) Set NORMAL/SAMPLE HOLD switch to SAMPLE HOLD.
 - (d) Set COIN CONTROL MARGIN switch to ON.
 - (e) Trip hopper trigger by hand.
 - (f) Place telephone handset on-hook:
 - Coin relay should operate and CR LED should be ON.

- (g) Set COIN CONTROL MARGIN switch to OFF.
- (h) If test (f) fails, repeat test with switch in OFF position.
- If test still fails, consult test desk for loop and ground measurements.
- (4) Foreign EMF Test—This is a special use test where the test desk may not be available but you do have access to service on the CO main distributing frame. It will show if there is induced or crossed battery and ground on the pair but will not indicate trouble on individual conductors.
 - (a) All OFF/ON switches in OFF position except POWER switch.
 - (b) Connect test set leads per Fig. 2:
 - -48V LED should light.
 - (c) Have tip and ring opened at CO main frame:
 - LED should go off.
 - (d) If any LED lights, call test desk for circuit test.

3.03 LED SIGNAL DETECTION EXPLANATIONS:

The sequence charts in Section 506-100-120 specifies when the following signals may be applied to the coin telephone for both Coin First Operation and Dial Tone First Operation. These signal indicators are not designed to work with range extenders (DLL, SRE, etc):

- -48: This LED indicates -48 volts ring to tip at the coin set. (This is the normal polarity applied to the set during call initiation.)
- +48: This LED indicates +48 volts ring to tip at the coin set. (This is the normal polarity applied to the set when an operator is on line during DTF calls.)
- -CP: The "minus coin presence" test is used to determine if initial rate requirements have been met in the DTF coin telephone

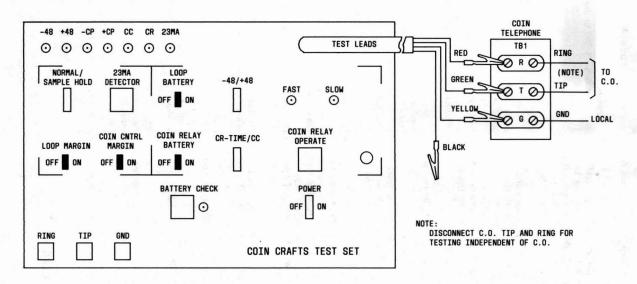


Fig. 2—Test Lead Set-up for All Tests Except Coin Relay Timing

set. This test is made with -48 volts tip to ground.

- +CP: The "positive coin presence" test is used to determine if the hopper has been cleared of coins. It is also used for the five cent local overtime charge. This test is made with +48 volts tip to ground (Note).
- CC: The "coin collect" LED is on whenever a coin collect signal is applied to the coin set (+130 volts tip to ground).
- CR: The "coin return" LED is on whenever a coin return signal is applied to the coin set (-130 volts tip to ground).
- 23MA: This LED is used with the test set 23MA test.

Note: In a CF office, -48 volts is applied; in a DTF or CF/DTF office, +48 volts is applied; however, in some offices, coin return voltage may be used for this test.

- 3.04 The CO Sequence Test: Tests the interaction between the coin telephone set and the CO equipment. During these tests, LEDs other than those shown may light. These others may be ignored. Prepare coin telephone set as follows and proceed as in (1) or (2).
 - Install P11C patch cord or hang cover of coin telephone set on KS-20950, L2 cover parking tool.
 - Connect test set leads to TB-1 of coin telephone set per Fig. 2.
 - · Set test set POWER switch to ON.
 - Depress Battery Check switch—Battery Check LED should light.
 - For extended LED viewing time set Normal/Sample Hold, switch to Sample Hold.



The -48, +48 LEDs are not controlled by Sample Hold switch. These LEDs will only light when the respective voltages are present in circuit. (1) Coin First Mode Operational Test:
Bullet (•) indicates Test OK action or normal response. If failure refer to table and step in Section 506-900-503 or follow instruction.

ACTION	FAIL TABLE	URE STEP
(a) Remove coin relay dust cover—lift handset off-hook—operate hopper trigger by hand:		
Dial tone is heard.	A	14
• -48 LED lights.		
(If both fail—CO or outside plant trouble is indicated—consult test desk)		
(b) Dial any digit except $\boldsymbol{0}$ or $\boldsymbol{1}$:		
• Dial tone remains after dialing.	A	15
(c) Set Loop Margin switch to On —deposit nickel:		
• Dial tone remains [if this test is OK, skip Step (d)].		
(d) Repeat test (c) with Loop Margin switch in Off position:		
 Dial tone remains—[If telephone set passes this test and failed test (c), refer to test desk for loop and ground resistance measurements]. 	A	16
The CO may time out to permanent signal if dial tone is requested past time out period.		
(e) Set Loop Margin switch to Off —set Coin Control Margin switch to ON —hang up handset:		

• CR LED lights while coin relay

this test is **OK**, skip test (f)].

operates and nickel returns [if

	ACTION	FAILU TABLE			(2) Dial Tone First Operat Bullet (•) indicates Test O normal response. If failure, refer	K action or
	(f) Repeat test (e) with Coin				step in Section 506-900-503 or follow	
	Control Margin switch in Off position:				After initial set up -48 LED shou then proceed as follows:	
	CR LED links while win when					
•	CR LED lights while coin relay operates and nickel returns [if	A	17			
	telephone set passes this test				ACTION	FAILURE
	and failed test (e), refer to test				ACION	TABLE STEP
	desk for loop and ground resistance				(a) Connect craft hand test set	
	measurements].				to ring and tip terminals of coin	
					crafts' test set with hand test set	
	(g) Set Coin Control Margin switch to off. Lift handset				in monitor position.	
	off-hook and deposit initial rate.				(b) With the handset on-hook,	
	Dial a busy number. When busy				depress 23MA Detector Switch:	
	signal is heard, hang up handset:			_	99 MA TED lights (if test fails	
				•	23MA LED lights (if test fails, refer to test desk for loop and	
•	+CP LED lights. (If the $+CP$				ground resistance test). Release	
	LED does not light and the coin relay operates or if the -CP				23MA Detector Switch.	
	LED lights and the coin relay operates, a CO trouble is indicated.				(c) Lift handset off-hook:	
	Refer to test desk.)			•	Dial tone should be heard.	B 4
					(d) Dial any digit except 0 or	
	Other LEDs will light during this test but may be ignored.				1:	
				•	Dial tone should be broken.	B 9
	(h) With handset on-hook-trip					
	hopper trigger by hand and depress				(e) Set Loop Margin switch to	
	and hold the 23MA Detector switch:				On—deposit 35 cents:	
				•	Totalizer should restore. Coin	
	20 14 1 17 1 11 11 11 11				tones should be heard in craft	
•	23MA LED should light. (If				hand test set (if initial rate is less than or equal to 35 cents).	
	23 MA LED does not light, refer to test desk for loop and ground				less than of equal to 55 tents).	
	resistance measurements.)				If Step (e) test is OK—skip test	
					(f).	
	(i) To ensure a completely				(f) Set Loop Margin switch to Off —Deposit 35 cents:	
	operational coin telephone set, proceed with Steps 4, 5, 6, 7,				Totalizer should restore-coin	В 5
	and 8 of the Eight Step Coin				tones should be heard in craft	Б
	Station Routine. Use the				hand test set. [If this test passes	23.5
	coin crafts' test set for coin relay				and test (d) failed, refer to test	
	timing as discussed in paragraph 3.06.				desk for loop and ground resistance measurements.]	

ACTION

FAILURE TABLE STEP

(g) Set Coin Control Margin switch to On. Hang-up handset:

CR LED lights while coin relay operates [if test OK—skip test (h)].

Proceed to Step (h)

B

6

(h) Set Coin Control Margin switch to off and retest:

CR LED lights while coin relay operates. [If this test passes and test (g) failed, refer to test desk for loop and ground resistance measurements.] Set Coin Control Margin to off.

(i) Lift handset off-hook, dial a busy or charged number and hang up before answer:

- -CP LED lights (failure indicates CO failure—refer to test desk).
 - (j) Lift handset off-hook, dial a busy number. After busy signal is heard, hang up handset:
- +CP LED lights—failure indicates
 CO failure—refer to test desk.
 - (k) To ensure a completely operational coin telephone set, proceed with Steps 4, 5, 6, 7, and 8 of the *Eight Step Coin Station Routine*. Use the coin crafts' test set for coin relay timing as discussed in paragraph 3.06.

3.05 Coin Telephone Testing and Timing Independent of CO—For this test, craftsperson will have to know coin telephone type and type operation (coin first or dial tone first) it is wired for. Telephone tests include test of dial, sidetone, totalizer, T1 rate contact, SCR and zener diode, and oscillator. Table and Step No. refer to corresponding entries in Section 506-900-503 and only coin telephone set related "Possible Cause" and "Remedial Action" entries apply. These instructions apply when there is no interaction

with the central office, ie, the coin station is being driven by the test set.

DANGER: There are high voltages on test leads when COIN RELAY OPERATE switch is depressed. KEEP HANDS CLEAR.

- (1) Set coin telephone and coin crafts' test set up as follows:
 - (a) Remove coin telephone front cover and install P11C patch cord or hang cover on KS-20950, L2 cover parking tool.
 - (b) Disconnect tip and ring of line at TB-1 of coin telephone set.
 - (c) Connect test set leads per Fig. 2.
 - (d) All OFF/ON SWITCHES in OFF position except POWER switch.
 - (e) Depress BATTERY CHECK switch:
 - BATTERY CHECK LED should light.
 - (f) Set COIN RELAY BATTERY switch to ON:
 - NEON lamp next to COIN RELAY OPERATE switch should light after approximately 12 seconds.
 - (g) Set CR (coin return)—TIME/CC (coin collect) switch to CR-TIME.
 - (h) -48/+48 battery switch to -48.
 - (i) Set LOOP BATTERY switch to ON.
 - (j) Proceed as in (2), (3), (4), or (5).
- (2) COIN FIRST OPERATION WITH 1A, 2A, 1C OR 2C COIN TELEPHONES

Note: Bullet (•) indicates **Test OK** action, if failure refer to table and step in Section 506-900-503.

ACTION

TABLE STEP

- (a) Handset on-hook—deposit 35 cents:
- Totalizer steps back—beep A 5 tones are heard from test set.

	ACTION	TABLE	STEP	(3) DIAL TONE FIRST OPERATION OR 2C SETS	WITH 1	ıC	
	(b) Return money by depressing Coin Relay Operate switch:			OR 20 SEIS			
•	Coin relay operates—money returned.	A	5	ACTION	TABLE	STEP	
	(c) Handset off-hook—set Loop			(a) Handset off-hook—deposit 35 cents:			
	Battery switch to Off—deposit nickel less than initial rate. Set Loop Battery switch to On:			 Totalizer steps back—beep tones are heard. 	В	5	
•	Totalizer does not step back—no beep tones heard.	A	7	(b) Handset on-hook—return money by depressing Coin Relay Operate switch:			
	(d) Hang up handset:			Money returns.	В	6	
•	Totalizer steps back—beep tones are heard.	A	6	(c) Handset off-hook—deposit			
	(e) Handset off-hook—operate dial:			• Totalizer does not step back—no	В	7	
•	Clicks/T-T signals are not heard—sidetone is present in handset.	A	6	beep tones are heard. (d) Operate Dial:			
	(f) Return money with Coin Relay Operate switch. Set Loop Battery switch to Off—Deposit initial rate—set Loop Battery switch On:			 Clicks/T-T signals are heard in test set. (e) Handset on-hook: 	В	7	
•	Totalizer steps back—beep tones are heard.	A	8,9	 Totalizer steps back—beep tones are heard. 	В	8	
	(g) Operate dial:			(f) Return money by depressing Coin Relay Operate switch take			
•	Clicks/T-T signals are heard in test set.	A	8,9	headset off-hook—set -48/+48 switch to +48—deposit nickel:			
	(h) Set -48/+48 switch to +48—operate T-T dial (this test does not apply to 1A coin sets):			 Totalizer steps back—beep tones are heard. 	В	12	
•	T-T signals not generated—sidetone is present in handset.	A	8,9	(g) With -48/+48 switch still in +48 position—operate T-T dial:			
	(i) Depress <i>Coin Relay Operate</i> switch to return money.			 C-type sets equipped with polarity guard—TT signals are heard. 			
	(j) All <i>Off/On</i> switches to <i>Off.</i> -48/+48 switch to -48.			 C-type sets not equipped with polarity guard—TT signals are not heard. 			
	(k) Disconnect test set and restore CO connections to coin set.			(h) All off/on switches to off —-48/+48 switch to -48.			

ACTION	TABLE	STEP		ACTION	TABLE	STEP			
(i) Disconnect test set and restore CO connections to coin set.				8/+48 switch to t initial rate:	+48				
(4) DIAL TONE FIRST OPERATION OR 2D SETS	ON WIT	TH 1D	a 1E1 set	loes not step back	51A	14,15,17			
ACTION	TABLE	STEP	set speaker	click is heard in r. If set is equi	ipped	1			
(a) Handset off-hook—deposit 35 cents:			with a 50A hopper, operate coin trap by hand and a click is heard in test set speaker.						
• Series of rapid beeps from test set.	В	12	(d) Handse	et on-hook:					
(b) Depress and hold T-T dial button or hold rotary dial at			 Totalizer s' are heard. 	teps back—beep	tones E	14,17			
off-normal position (during wind-up portion of dial cycle)—deposit dime:				8/+48 switch to t initial rate:	-48				
• Coin signal beep tones are not	В	12	 Totalizer stare heard. 	teps back—beep	tones E	14,17			
heard.			(f) Retrieve	e coins.	E	16			
(c) Release dial:			(g) All OFF	7/ON switches to	OFF.				
• Two beep tones are generated when dial returns to normal.	В	12		ect test set and re tions to coin set.	store				
(d) -48/+48 switch to +48—deposit nickel:				Relay Timing ay be disconnected: 1:					
• Beep tone is heard.	В	12	(a) Conne	ect test set lea	ds-green	to No. 3			
(e) All off/on switches to off: -48/+48 switch to -48.			terminal o	nal of coin relay of coin relay, blac stor (Fig. 3).	19				
(f) Disconnect test set and restore CO connections to coin set.			(b) Set te	est set Power sv	witch to On				
(5) DIAL POST PAY OPERATIO OR 1E3 SETS	N WITH	H 1E1	(c) Depres	ss Battery Che	eck switch:				
OR TES SETS			Batte	ery Check LED	should ligh	nt.			
Note: Insert KS-14995, L3 tool chute and hopper to prevent lo			(d) Set <i>C</i>	oin Relay Bat	tery switch	to On:			
ACTION	TABLE	STEP	• Neon 12 sec	lamp should light conds.	after appro	oximately			
(a) Handset off-hook:			(a) G-1 G	D Time (CC	tah 4a 4b - 4	OD 17:			
• Sidetone present in handset.	Е	4	(e) Set C	R-Time/CC switten.	ich to the (π-11me			
(b) Rotate and release dial:						3134			
• Clicks heard in test set.	E	5	(f) Trip c	coin relay hopper	trigger.				

- (g) Press and hold Coin Relay Operate switch—[after neon lamp Step (d) is lighted];
 - Observe Fast and Slow LEDs and refer to Table A of this section for action required.
- (h) Unfasten and lift out P-15E730 coin return chute assembly if not already done (single-slot chute).
- (i) Set CR-TIME/CC switch to CC.
- (j) Depress Coin Relay Operate switch:
 - Observe if coin vane in hopper moves to the collect position.
- (k) Reassemble disconnected components.
- (l) All **OFF/ON** switches to **OFF** position **CR-TIME/CC** switch to **CR-TIME**.
- (m) Disconnect test set and restore P1 plug.

4. MAINTENANCE AND ORDERING

- 4.01 Under normal use, the KS-21250, L2 test set should not require repair or maintenance except battery replacement.
- 4.02 Battery Replacement: Turn captive locking screw counterclockwise and lower hinged battery compartment door. Pull plastic latch forward and down and slide battery cartridge

completely out. Replace batteries taking care to observe polarity as marked on battery cartridge. Restore cartridge to compartment taking care to observe guide tracks on top and bottom of battery compartment. Engage plastic latch and seat firmly. Close door and lock with captive screw. Replacement batteries for the KS-21250, L2 test set are:

KS-14368 1.5V AA-type

or

- For operation below 0°F—Eveready No. E91, or Ray-O-Vac No. 815 batteries.
- 4.03 The KS-21250, L2 Coin Crafts' Test Set comes complete with carrying strap, cover, and instruction cards. Only the batteries must be ordered separately.
- 4.04 If necessary, new replacement carrying strap, test set cover, and instruction cards may be ordered by KS list number.

(a) ORDER AS FOLLOWS

- KS-21250, L2-Coin Crafts' Test Set
- KS-21250, L5-Instruction Cards
- KS-21250, L6—Test Set Cover
- KS-21250, L7—Carrying Strap.

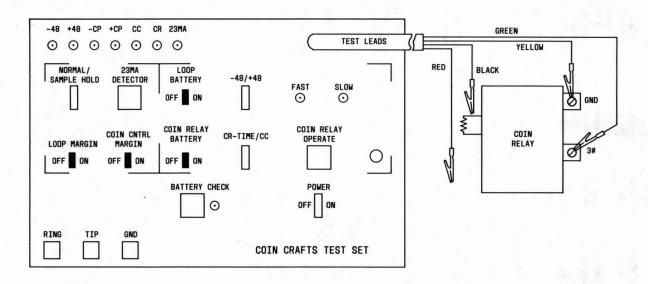


Fig. 3—Test Lead Set-up for Coin Relay Timing

TABLE A

BELOW -20°F	–20°F TO 20°F	20°F TO 60°F	60°F TO 100°F	ABOVE 100°F
Test set indicator lights will indicate SLOW after adjustment.				-FAST- then 1/4-turn CCW
			-FAST- then 1/2-turn CCW	
		-SLOW- then 1/4-turn CW		
	-SLOW- then 1/4-turn CCW			
-SLOW- then 1/2-turn CCW				

Note: Adjust coin relay timing screw in 1/4-turn increments until the KS-21250, L2 test set indicates only FAST or SLOW as specified for the temperature range at time of adjustment. Then turn the relay timing screw clockwise (CW) or counterclockwise (CCW) the specified amount as indicated on the chart.