

REPAIR OF KS21271  
TRW CINCH CONNECTORS  
USED PRIMARILY ON EARLY  
D4, M13, AND L1 BACKPLANES

CONTENTS

- |                           |  |
|---------------------------|--|
| 1. GENERAL                | 4. TERMINAL PIN REPAIR AND REPLACEMENT |
| 2. TOOLS AND MATERIALS    | 5. CONNECTOR REPLACEMENT AND REPAIR    |
| 3. PREPARATORY OPERATIONS |  |

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1. GENERAL

1.1 Scope of Section

1.11 This section covers the methods and requirements for removing and replacing defective terminal pins and/or connector housings which are the components of the CINCH connector, KS21271.

1.12 The requirements and figures in this section shall be followed and apply only to the condition being described. These requirements may be modified in subsequent parts of this handbook section to cover other conditions.

1.13 The requirements and descriptions of this HB Section 130.3 apply specifically to the KS21271 CINCH connector.

1.2 Precautions

1.21 General precautions are covered in Handbook 0 and are to be observed at all times as they apply to the particular operations being performed.

1.22 It is of utmost importance that personal injury, equipment damage and service interruptions be prevented.

2. TOOLS AND MATERIALS

2.1 Special Tools

2.11 R-4846, Det 10 - Pin Knock Out Tool, pin broken even with boss.

2.12 R-4846, Det 1 - Pin Knock Out Tool, pin broken above boss.

2.13 R-4791, Det 10 - Dummy Plug-In Board.

2.2 Common Tools

2.21 R-4108 Diagonal Wire Cutters.

2.22 R-7880 Gas Plier, 6".

2.23 R-2120 Needle Nose Pliers.

2.24 KS-22035 Spudger.

2.25 KS20827L1 Unwrap Tool, 22g to 26g.

2.26 R-4621 Unwrap Tool, 28g and 30g.

2.27 R-4473 Cutting/Skinning Tool.

2.28 R-4473, Det 17, 28g Blade.

2.29 R-4473, Det 16, 30g Blade.

2.210 R-4430 Tweezers.

2.211 R-4660 26 gauge Wire Wrap Bit.

2.212 R-4435 28 gauge Wire Wrap Bit.

2.213 R-4183 30 gauge Wire Wrap Bit.

2.214 R-4184 Wire Wrap Bit Sleeve.

2.3 Repair Pins - Listing and Description

2.31 Refer to Table I for specific repair pins to be used in fixing a particular connector in the KS21271 series.

2.32 KS21271 Pin Type Descriptions

2.321 Repair pins have an indentation embossed in the flat surface adjacent to the anchoring barbs. When a repair pin is inserted into a connector housing, this indent is inbedded in the housing. This provides additional holding force for securing the pin to the connector housing. The pins that come in the connector do not have this indentation. They are referred to in this section as "conventional" pins. Only the "repair" pins have this indentation.

2.322 Fig. 1 shows a side view of the List 12 connector. The contact part of the "early make" pins are shaped such that when a plug-in unit is inserted into the connector, electrical contact is made with them first. As the board is pushed further into the connector, electrical contact is subsequently made

with the "late make" type pins. When looking at the contact end of a connector (from the front of the bay), the early make pins are on the left side of the connector and the late make pins are on the right.

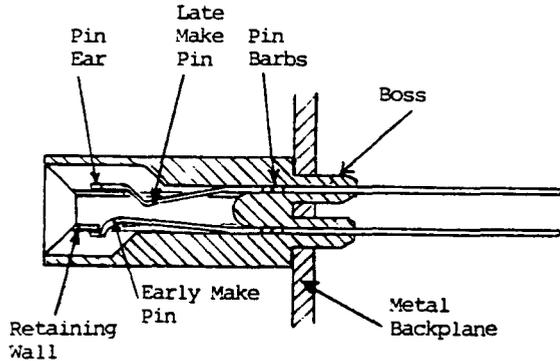


FIGURE 1

2.323 Fig. 2 shows a shorting pin pair in the List 13 connector. The contact ends are not designed with pin ears and hence are not constrained by the retaining walls of the housing. When one pin of a shorting pin pair is removed, the one opposite will spring past the center of the plug-in entry slot. If a plug-in unit is inserted at this time, the pin will be jammed into the connector housing causing damage to both. The dummy board (R4791, Det 10) should be inserted in the connector before a shorting pin is removed.

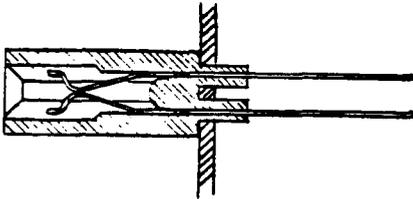


FIGURE 2

2.324 Fig. 3 shows an M13 connector housing cross section depicting a pair of standard terminal pins. Here, a plug-in unit makes electrical contact on both sides of its printed circuit board simultaneously as it is inserted into the connector.

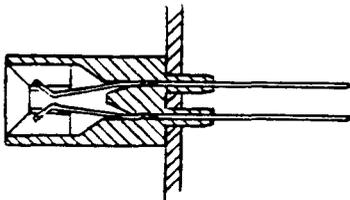


FIGURE 3

2.325 Fig. 4 shows an M13 housing with a pair of the new style shorting pins used in the gold colored housings. These pins are designed so that the contact ends are constrained by the retaining walls of the connector housing. This pin can be identified from the standard M13 pin by the angle of the ears at the end of the contact part of the pin. The ears of the shorting pin are bent at a sharper angle to the contact surface than on the standard contact.

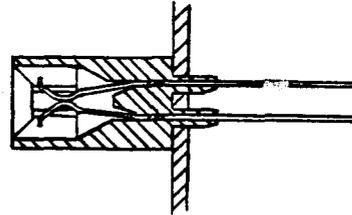


FIGURE 4

2.3251 The old style M13 shorting pins which are present in the black connector housings are shaped like the shorting pin pair shown in Figure 2.

2.3252 This old style M13 shorting pin is no longer available from the supplier. A small supply of the connectional pins (not the repair type) is available from the installation engineering group at Merrimack Valley Works, Dept. 21440. If repairs on these pins are necessary, they must be installed per paragraph 4.5.

2.326 The LT1 and LT1E pins have the same shape as the M13 pins except that the wrappable part of LT1 pins is longer than on the M13 pins.

2.4 KS21271 Connector Listing/Description

2.41 See Table I for specific KS21271 connector list numbers used in various products.

2.42 The LT1 (List 18) connector has a black housing and has been superseded by the gold colored List 21 connector. Replace List 18 connectors with List 21 connectors where required.

2.43 The M13 connectors have been redesigned using gold colored material for the housings. Where required, replace old style connectors (black housings) with new gold ones of the same list number.

3. PREPARATORY OPERATIONS

3.1 Remove plug-in units as necessary to access connector housings that are damaged or contain unservicable pins.

3.2 Remove plastic cover over backplane and mark wires to be disconnected. Record their pin location number on a report form to facilitate the reconnection operation.

3.3 Disconnect the affected wire wrap connections per instructions in Handbook 9, Sections 310-314, and 350. After repair work is complete reconnect wires per above Handbook Sections.

#### 4. TERMINAL PIN REPAIR AND REPLACEMENT

##### 4.1 Straightening Pins

4.11 If the wrappable part of a pin is bent, it should be straightened with a wire wrap bit, or the R4846 Det 1 pin knockout tool. The tool or bit should completely cover the wrappable portion of the pin. Excessive flexing of the pin will weaken and very likely break it. Needle nose pliers can also be used.

##### 4.2 Removing Terminal Pins from Connector Housing

4.21 From front of bay, inspect the contact side of connector to insure no pins are misaligned and will interfere with insertion of the dummy plug-in board. Should the plug-in slot be fouled with any bent or unconstrained shorting pin, this pin must be removed before the dummy plug-in board can be inserted. Remove such pins per pars. 4.23 to 4.26 or Par. 4.3.

4.22 Push the dummy plug-in board into the connector per Fig. 5. The dummy board is made from 1/16" thick fiberglass or phenol fabric material.

4.23 Place a piece of cardboard on shelf flush with connector housings. If dislodged pin(s) are ejected from the housing, the cardboard will prevent them from falling into lower parts of the bay.

4.24 Pins are dislodged from connector housings with the appropriate knockout tool working from the rear of a the bay.

4.241 If the defective pin(s) is broken off flush with boss, dislodge it from the connector using pin knockout tool R-4846, Det 10. The tool head should encircle the housing boss and seat on the metal backplane. Strike the plunger sharply but not excessively to dislodge the pin. See Fig. 5.

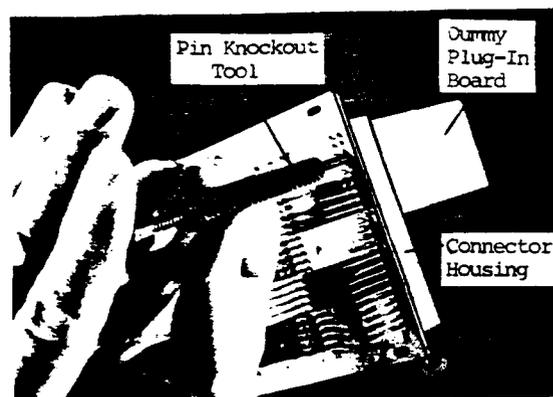


FIGURE 5

4.242 If the defective pin(s) extends above its housing boss, dislodge it with tool R-4846, Det 1.

4.25 If pin being removed is a shorting type without pin ears, keep the dummy board inserted in the connector. The dummy board must stay in the connector until the new repair pin has been replaced per pars. 4.43 - 4.45.

4.26 If pin being removed has pin ears on ends of its contacts, remove the dummy board from the connector to facilitate its removal.

4.27 From front of bay, pull the dislodged pin out of the housing using needle nose pliers.

##### 4.3 Alternate Pin Removal Procedure

4.31 If the proper pin removal tool is not available, a pair of needle nose pliers can be used. Care must be exercised not to bend adjacent pins and damage wire wrap connections. With pliers, grasp the pin firmly 1/16" above the boss. Apply enough pressure straight in towards backplane to dislodge it from housing.

4.32 Remove pin(s) from connector per pars. 4.25 - 4.27.

##### 4.4 Terminal Pin Replacement

4.41 With auxiliary lighting, inspect connector housing for damage.

4.411 Specifically, the top or bottom edges of the housing should not be split due to vertical misalignment of a plug-in unit.

4.412 The contact retaining walls must be undamaged. Pin contacts are positioned correctly in the housing when pin "ears" are behind the housing retainer walls. See Figs. 1 and 6.

4.413 If any of the housing retainer walls are broken or other part of the housing is defective, replace the connector per par. 5.

4.42 Insert the dummy plug-in board into that part of connector slot where pin(s) is to be replaced.

4.43 Select the appropriate repair pin per Table I. Repair pins are embossed with indentation in flat surface next to barbs that anchor pin in housing.

4.44 From front of the bay, slide the pin, properly oriented, into the appropriate slot in connector housing. Figs. 1 to 4 show proper orientation of pins in the housing. Push pin in far enough so that tip can be grasped with needle nose pliers from rear of bay.

4.441 If it is difficult seeing which slot the pin is supposed to go in, a second installer can shine a light at the holes in the bosses from rear of bay.

4.442 If work area next to connector is so tight that pin can't be inserted into housing properly, remove the dummy board. Start pin into proper hole in housing and then reinsert dummy plug-in board. This procedure can't be utilized if shorting pins without pin ears are the particular pins being replaced.

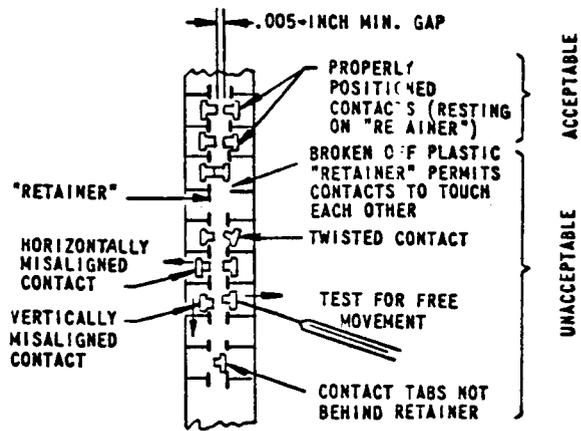
4.45 From rear of bay, pull the pins straight into position in the housing with needle nose pliers. The ears of the pin contacts must be behind their respective retaining walls in the connector housing. See Figs. 1 and 6.

4.46 Remove the dummy plug-in board.

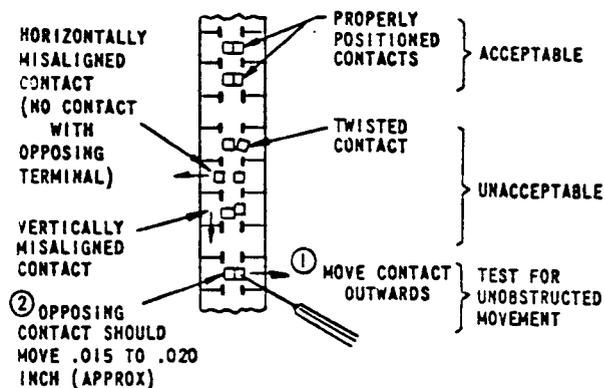
4.47 Inspect the contacts of all pins and insure they are seated at the same relative position or height in the housing. They should all appear in a straight line. Inspect pin contacts for deficiencies explained in Fig. 6.

4.471 The inspection criteria for standard terminals apply for

the new style shorting pins presently used on M13 and LT1E panels.



ACCEPTABLE AND UNACCEPTABLE STANDARD TERMINALS IN KS-21271 CONNECTOR



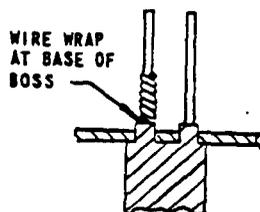
ACCEPTABLE AND UNACCEPTABLE SHORTING TERMINALS IN KS-21271 CONNECTOR

FIGURE 6

4.5 Alternate Pin Replacement Procedure

4.51 If repair pins are not available, reinstall an appropriate conventional pin in the connector housing per par. 4.4.

4.52 Secure the pin in its proper position by affixing a wire wrap to it in direct contact with connector boss. Use 26 gauge bare wire and trim excess flush with boss. See Fig. 7.



SECURING A REPLACED TERMINAL

FIGURE 7

4.53 Inspect the wrapped pin to make sure it did not back out of the connector housing during the wirewrap operation. Also inspect the wirewrap to insure that wire does not short out against adjacent terminals.

4.6 Reconnect backplane wires per Handbook 9, Section 350.

## 5. CONNECTOR REPLACEMENT AND REPAIR

### 5.1 Connector Housing Removal

5.11 Order proper list connector per Table I from Electronic Components Division of TRW, Inc., 1500 Morse Ave., Elk Grove Village, Ill. 60007.

5.12 Remove plug-in units as required to access the damaged connector.

5.13 Place cardboard sheet on shelf up against backplane and under connector housing to be removed. This will prevent pins and housing from dropping into lower parts of the bay during removal.

5.14 From rear of bay, cut pins flush with housing bosses that have wires connected to them. Tag wires and record pin locations on a report form to facilitate the reconnection process.

5.15 The defective housing is forced out of the metal backplane using a hammer and strike block which is positioned over the pin bosses. A second installer must provide restraint against metal backplane with 12" long block from front of bay while first installer strikes housing from rear of bay.

5.151 From rear of bay, place strike block over all bosses on housing and strike firmly and uniformly with hammer until bosses are almost flush with backplane. **WARNING:** Backplane wiring may pass between bosses of the housing being removed. Caution must be exercised not to damage these wires.

5.16 From front of bay, pull loosened housing out of backplane with pliers.

ATTACHMENT:  
Table I

### 5.2 Installing New Connector in Backplane

5.21 Inspect and clean out boss holes in the metal backplane before installing new connector.

5.22 Select the appropriate list KS21271 connector

5.23 From the front of the bay insert the connector terminal pins through the boss mounting holes in the backplane. Press the connector using sufficient arm strength to seat it temporarily in the backplane.

5.24 Using a 5/8" X 3" X 12" long strike block and light hammer, seat the connector housing into the metal backplane. Housing should be flush with backplane. A second installer must provide restraint against backplane from rear of bay while this work is being done.

5.25 Inspect terminal pins, connector housing and bosses.

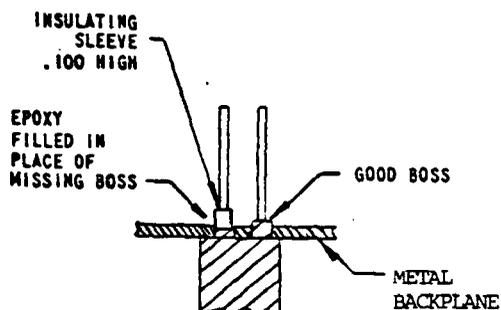
5.26 Check housing for proper shelf alignment with a plug-in unit.

5.27 Reconnect wires as required.

### 5.3 Damaged Boss Repair

5.31 Scrape or cut off any jagged edges that may be present on the broken surface of the boss. Surface must be flat so sleeve can be glued to it.

5.32 Apply a fast-drying epoxy to cleaned off boss surface, slide a .100" long, 1/8" diameter sleeve down the particular pin, and affix it to the prepared surface. See Fig. 8.



REPAIR OF BROKEN OR MISSING BOSS

FIGURE 8

5.33 Allow epoxy to fully cure before reconnecting wires to pin. This repair will prevent short circuits between the metal backplane and the pin.

5.34 No repair should be attempted on the retaining walls of a connector housing. Replace connector per pars. 5.1 and 5.2.

Manager, Engineering Transmission Products

TABLE I

CONNECTOR DATA		PRODUCTS USED ON	REPAIR PIN INFORMATION			DESCRIPTION
LIST	COMCODE		LIST	COMCODE	TRW CINCH ORDER#	
1	401241559	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
2	401241567	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
3	401242575	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
4	401212576	Data Set 209	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
5	401258884	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
			106	402396196	416-00-16-366	New Shorting, Gold Block Only
6	401258892	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
			106	402396196	416-00-16-366	New Shorting, Gold Block Only
7	401258900	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
			106	402396196	416-00-16-366	New Shorting, Gold Block Only
8	401336979	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
			106	402396196	416-00-16-366	New Shorting, Gold Block Only
9	401669403	Echo Sup Term	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
10	401805304	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
11	401805312	M13	101	402396188	425-01-00-044	Std Contact, Black or Gold Block
12	401787049	Early D4,LT1 LTIE	103	401962584	416-00-99-342	D4 High Contact, Black Block
			104	401962576	416-00-99-340	D4 Low Contact, Black Block
13	401787056	Early D4,	103	401962584	416-00-99-342	D4 High Contact, Black Block
			104	401962576	416-00-99-340	D4 Low Contact, Black Block
			105	401962543	416-00-16-338	D4 Shorting, Black Block
15	401813340	Trans System	106	402396196	416-00-16-366	New Shorting, Gold Block Only
16	401805320	Echo Sup Term	106	402396196	416-00-16-366	New Shorting, Gold Block Only
			101	402396188	425-01-00-044	Std Contact, Black or Gold Block
17		LT1	103	401962584	416-00-99-342	D4 High Contact, Black Block
			104	401962576	416-00-99-340	D4 Low Contact, Black Block
			105	401962543	416-00-16-338	D4 Shorting, Black Block
18	402169338	LT1	107	402396204	425-01-00-045	Std Long Tail, Black Block
19	402643084	LTIE	103	401962584	416-00-99-342	D4 High Contact, Black Block
			104	401962576	416-00-99-340	D4 Low Contact, Black Block
			105	401962543	416-00-16-338	D4 Shorting, Black Block
20	402643092	LTIE	107	402396204	425-01-00-045	Std Long Tail, Gold Block
				403407483	416-00-16-380	Shorting Long Tail, Gold Block
21	402698104	LT1	107	402396204	425-01-00-045	Std Long Tail, Gold Block