

INSTALLATION OF
"COSMIC" DISTRIBUTING FRAME

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1. SWITCHBOARD CABLE AND WIRE

1.1 Types and Colors

- 1.1.1 The "COSMIC" Common System Main Inter-Connecting Distributing Frame utilizes standard switchboard cables such as the 806A (100 Pair-26 Gauge), 813A (50 Pair-26 Gauge), and 276A (12 Pair-24 Gauge).
- 1.1.2 The jumper wire used for cross-connecting "outside plant" to "line equipment" is the "IPVC" Irradiated Polyvinyl Chloride Wire coded DT 24P (Yel-Tip & Blue-Ring). Yellow/orange, yellow/green and yellow/red are optional colors that may be specified by the Operating Company (OC). However, the yellow lead is always considered as the tip lead. Information on running jumper wire is covered under "Cross-Connection" paragraphs.

1.2 Cable Running Information

- 1.2.1 The Installers Cable Running Lists furnished to the field is the standard "EFG 351" output. These cable running sheets are furnished by the Regional Engineering Organizations; therefore, whenever questions or lack of information arises, they should be

contacted. For further information regarding "cable running lists" refer to Handbook 8, Section 110.

1.3 Sequence and Planning

1.3.1 The majority of cables for the "COSMIC" D.F. are presently being run on ladder-type cable racks; therefore, the cables will require clipping or sewing (unless otherwise directed by the BOC). Where clipping is required, the installer should plan to place all anchor clips in position prior to running cables on these racks. Nylon cable ties are not approved for securing cables to the cable rack.

1.3.2 All cable racks should be identified by route number so the routing information provided on the cable tags can be followed. All cable tags should be sorted into route bundles to maintain maximum cable running efficiency. For further information, refer to Handbook 8, Sections 120 and 150.

1.4 Cable Protection

1.4.1 Cables shall be protected at all locations where they bend sharply around or run across edges of metalwork. For]

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locations not covered by specific methods, apply 1/64" Gray Sheet Fiber (RM-583101) to the metalwork. If the metalwork cannot be protected, then firmly secure sheet fiber around the cables at these points being sure fiber cannot be dislocated.

1.4.2 On "ladder-type" cable rack where the cables turn off the stringers and drop 3" or more, apply a P-328952 Fiber Insulator. Where cables pass over and through the cross straps, a P-68616 Fiber (cut to fit) shall be secured to the cross straps for cable protection. For further information, refer to Handbook 8, Section 131.

1.5 Securing Cables

1.5.1 Cable Clips (Ladder-Type Racks)

1.5.1.1 Secure cables on ladder-type cable racks with standard anchor clips, starter clips and regular clips. For information regarding placement and application, refer to Handbook 8, Sections 301 and 312.

1.5.2 Sewing

1.5.2.1 It is permissible to sew on ladder-type cable rack where it is uneconomical to clip due to irregular cable sizes, or because of limited access to the cable rack. On the 5" cable racks located directly above the "COSMIC" modules, the cables must be sewn to the last cross strap before entering into the vertical cable trough.

1.6 Cable Reel Verification

1.6.1 All cable reels shall be checked to verify that the type of cable on the reel agrees with the cable reel tag prior to any cable running operations.

1.7 (From - To) Cable Check

1.7.1 All cables and wires should be checked to be sure that they are in the proper (to and from) locations after all cable running operations have been completed. This verification should be done prior to any securing, butting, or stripping operations, thereby minimizing possible cabling errors or omissions. Use the ITE-4137 Continuity Test Set or equivalent set for verification.

2. CONTINUITY VERIFICATION

2.1 Source of Verification

2.1.1 The cable connecting sheets laid out in the field, the CCED, or SWF sheets, should be used to perform the fanning, connecting and verification operations of all switchboard cables and "P" wires.

2.2 Procedure

2.2.1 Cables connecting on a frame are referred to as originating (from) or terminating (to) depending on the frame control of a given cable run. Frame folders should contain both the originating and

terminating cable connecting information. Therefore, the originating (from) cables should be verified at that particular frame and the terminating (to) cables at their respective controlling frames.

2.2.2 Each cable connection should be Continuity Tested between their respective (from) and (to) terminations until all terminated conductors have been verified.

NOTE: Use of conductor colors should not be employed during verification operations. Use the point-to-point method for verification.

3. USE OF NYLON CABLE TIES

3.1 Tools

R-4827 Tool, Fastening, Cable Tie
R-4370 Holder, Nylon Cable Tie
R-1102 Spudger

3.2 Supplies

R-4265 Cable Tie, Nylon
List 1 For Forms of 1-1/4" Maximum Dia.
List 2 For Forms of 2" Maximum Dia.
List 3 For Forms of 3" Maximum Dia.
List 4 For Forms of 4" Maximum Dia.

3.3 General

3.3.1 The R-4265 Cable Ties may be used in place of twine for general banding, for banding at breakouts on bay vertical loose wire forms for superimposing operations involving cable and wire forms, and positioning at cable brackets.

3.3.2 Where normal sewing operations are being performed, such as the sewing of loose wire or local forms, it may be more expedient to use pneumatically applied nylon ties.

<p><u>CAUTION:</u> THE USE OF DIAGONALS AND OTHER NON-APPROVED CUTTING DEVICES WILL LEAVE TAIL ENDS WITH VERY SHARP EDGES. THESE EDGES ARE CONSIDERED DANGEROUS AND HARMFUL TO PERSONNEL WORKING IN THE VICINITY. USE ONLY THE PROPER TOOL.</p>

3.3.3 The spacing requirements for the pneumatically applied nylon ties are the same as those for sewing with twine. Refer to Sections 220 through 224 and 233 through 235 of this handbook.

3.3.4 Refer to Section 205 for the methods and requirements, associated with use of nylon cable ties.

4. BUTT AND STRIP OPERATION

4.1 General

4.1.1 The butting and stripping operations shall be done in the standard manner as covered in Handbook 8, Sections 400 and 410. Any deviation from these standard methods will be covered in paragraphs for that specific frame.

4.2 Tools and Supplies

- R-1514 Shears, Cable
- R-4827 Fastener, Cable Tie
- R-4366 Combination Butt-Strip Tool
- R-2916 Twine
- R-4265 Nylon Cable Ties

NOTE: Tools normally supplied in the Installers 168 Kit are not listed.

5. CONNECTING

5.1 Solderless Wrap Terminals

5.1.1 All connections to solderless wrap terminals should be made using standard wire wrapping tools listed in this handbook, Section 311 and in accordance with methods and requirements of Section 310. Only apparatus and equipment listed in Sections 314 through 314Z have terminals approved for solderless wrapped connections.

5.1.2 All solderless wrapped connections should be inspected prior to turnover to the Operating Company. Any defective connections should be soldered before being considered an approved connection. The KS-14440 L-16 Soldering Iron with L-38 Tip and RM-728225 Low Temperature Melting Solder is recommended. When soldering defective connections on the 302 or 308 connectors (protector frame), the R-3367 Heat Sink should be used to dissipate the heat and eliminate possible damage to the plastic molding.

6. PROTECTOR FRAME

6.1 Butting and Stripping

6.1.1 After cable verification and prior to the butting and stripping operations, all cables should be trimmed back to a convenient length for ease of handling using the R-1514 Cable Shears. Extreme caution should be used when trimming back cables to avoid causing possible short cable lengths.

6.1.2 Each 302 or 308 connector cable should be butted approximately 1/2" below the weld pin with the combination R-4366 Butt-Strip Tool.

6.2 Form, Fan, and Dress

6.2.1 A new Color Code Assignment Table (Table B) has been initiated for the "COSMIC" Distributing Frame to protector (302 connector) frame cables. This new form, fan,

and dress arrangement will provide a neat appearing, simplified wiring operation. See Section 128 for 308 protector.

6.2.2 The form at the protector frame end of the cable is a single leg form that runs directly down the center of the 302 connector. The following operations will provide for an efficient installation:

- a. Trim off the excess cable slack and mark the cable butt location 1/2" below the weld pin. (See Figure 1.)
- b. Butt and strip the cable and then secure it to the weld pin with either twine or a nylon cable tie (be sure not to lose binder identity).
- c. Bring the cable along the top of the (5-slot) fanning strip and secure it in the approximate center using twine or a nylon cable tie. (See Figure 1.)
- d. Bend the cable over at this secured point and bring it down the center of the 302 connector.
- e. Break the blue binder out of the cable and turn it in toward the connector side. Place a band (cable tie or twine) approximately 4" below the 5-slot fanning strip of the connector position.
- f. Proceed to break out the orange, green, brown, and slate binders, respectively, in the same manner described in e. Band each binder approximately 2-1/2" apart.

NOTE: Each band securing a binder breakout point should be located approximately in the center of the 5 rows served by the binder, i.e., (blue) rows 2-3, (orange) rows 2-8, etc.

- g. When the binders are secured in the approximate center of the field they serve, trim all the binder leads back leaving at least a minimum of 7" from the band point to the wire end.
- h. Proceed to skin all the leads so they have a "skinner" lead length (insulated portion of the wire) of 4", the "skinner" (bare wire) portion of the wire depends on the gauge of wire being solderless wrapped. (See Figure 2.)
- i. Proceed to solderless wrap the cable leads according to Table B. It appears that working top down, and left to right would be the easiest, i.e., start with the yellow identifiers (dots and dashes) and work to the right; then the black, red, and white color coded leads.
- j. After all the leads have been connected, dress them so they have a neat workmanship appearance. (See Figure 3.)

7. "COSMIC" MODULES

7.1 Butting and Stripping

7.1.1 To avoid the cables from crossing and twisting, it is important that the cables enter the vertical trough in the proper sequence before the butting, stripping, and securing operations; therefore, the cables serving shelf 1 of the right (rear view) module, should be located to the extreme right side of the rack, then cables serving shelf 2, etc. However, when the cables serve the left (rear view) module, they in turn should be located to the extreme left side of the cable rack. Refer to Figure 4 for typical right module cable layout.

7.1.2 All cables entering the vertical cable trough shall be butted approximately 1-1/2" below the top bracket and secured there using a double strand of approved twine.

7.1.3 After the cable sheathing has been removed from the cables, they should then be separated by shelf number (starting with top shelf No. 1) and fed through the proper slots located in the side of the vertical trough (refer to Figure 5). Each cable arm shall be banded with twine or nylon cable ties at the breakout points.

7.1.4 After the cables have been butted, stripped, and secured to the top bracket (strap) of the vertical cable trough (chute), the R-4254 Detail 4 PVC Insulators shall be cut to fit and "snapped" onto the lower three straps to provide cable lead protection from the metalwork. Secure the vertical form to these straps with 2 strands of twine or R-4265 Nylon Cable Ties.

7.2 Fanning and Dressing

7.2.1 General

7.2.1.1 The cable lead "Loop Type" fanning strip located at the rear of each shelf has openings spaced at every 2". Therefore, with 64 pair terminal strip being approximately 4" long, the equal distribution of cable leads across the rear of the shelf should be 32 cable pairs per loop.

7.2.1.2 Where five 100 Pair Terminal Strip serve any given shelf, the following pattern, although not completely balanced, can be used. Starting at the Butt End of the Cable Arm: a) Fan 32 Cable pairs into each of the first seven loops; b) Fan 24 Cable Pairs into Fanning Loop Eight; c) Fan 32 Cable Pairs into each of the next seven Fanning Loops (9 through 15) and; d) Fan 28 Cable Pairs into the last Fanning Loop (16).

7.2.1.3 Where assignments indicate that a 100 Pair Cable has been assigned to two 50 Pair Connecting Blocks, located in adjacent half-modules (other than the first or last half-module of a lineup) the cable involved should enter the appropriate shelf in the normal manner to feed the first 50 Pair Block (Pairs 1-50) located at the far end of the

shelf. The remaining 50 Pairs and spares should then be formed through the vertical upright opening and fanned to the second 50 Pair (Pairs 51-100) Connecting Block located in the adjacent half-module. This form should be banded to the fanning strip at a point where it leaves half-module and again where it enters the other. It may also be necessary to place 2-3 twine bands or nylon tie on this form to retain its shape and neat workmanship appearance. (Refer to Drawing ED-6C011-10.)

7.2.1.4 Where a 50 Pair Connecting Block is located in either the first or last half-module of a frame lineup, this odd numbered connecting block should be cabled individually with a 50 Pair Cable.

7.2.2 Drawing ED-6C011-10 shows typical connecting block layouts for Tie Cable Pairs, ESS No. 1, Step-by-Step and No. 5 Crossbar; however, before using these figures, the job layout sheets should be completely checked to be sure both layouts agree. Remember, these figures are typical, so check and be sure.

7.3 Connecting (Front Side)

7.3.1 Terminating the Cable Leads to the 78C-Type connecting blocks from the front side of the frame is the preferred method by most installers. However, when connecting from the front side, the skinner lead lengths are considerably longer than when connecting from the rear side. This extra lead length should be dressed into a flat "S" type curve pressed down flat as possible on the bottom of the shelf to allow the service observing cords to be connected to the rear, (cable side) side terminals.

7.3.2 The R-4451 Wiring Fixture has 2 brackets located on the back side which will allow it to hang from the connector block lower mounting flange on the frame shelf. It also has two 1/4" holes located in the lower portion of the plate to accommodate tilting when desired. Where tilting is required, the installer should cut 2 pieces of rigid PVC tubing (length between fixture plate and top perforated block mounting flange) to a convenient length and secure in place with twine or nylon cable ties. (Refer to Figure 6.)

7.3.3 When connecting cable leads from the front side of the frame, the following procedure can be used:

- Fan cable leads through the appropriate loops of the rear fanning and pass these fanned leads through to the front side (refer to Paragraphs 7.2.1.1 and 7.2.1.2).
- Fasten the R-4451 Wiring Fixture to the bottom flange of the shelf to be connected, and tilt if desired.
- Mount all the connector blocks (wire wrap terminals toward front) in the proper sequence as they will finally appear on the frame. Remember, the

bottom row will appear to be the top row when mounted in this position for wire terminating.

- d. In this position all blocks can be completely wired. When terminating a heavy concentration of 22 or larger gauge wire, it should be handled differently than the smaller 24 and 26 gauge wire. The larger gauge leads should not be dressed through the block fanning strip. These leads should run over the top (outside) of the fanning strip and terminate in the normal manner. After all leads of the block have been connected, band each group of wires to the outside of the fanning strip with approved twine.

CAUTION:	WHEN A HEAVY CONCENTRATION OF LARGE GAUGE CABLE LEADS ARE DRESSED THROUGH THE BLOCK FANNING STRIP, THERE WILL BE DIFFICULTIES ENCOUNTERED MOUNTING THE BLOCK. THE CABLE LEADS ARE COMPRESSED AGAINST THE BASE OF THE SHELF AND CREATES A POSSIBLE FUTURE "COLD FLOW" CONDITION IN THE PVC INSULATION OF THE CONDUCTORS. RUN THESE LEADS OUTSIDE THE BLOCK FANNING STRIP.
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When smaller gauge wire (24 or 26GA) terminates on the 78C-Type Blocks, refer to the correct cable connecting document (CCED, SWF, Figure 7, etc.) and connect the leads in the normal manner. Remember you are connecting in an upside down position - so be sure of what you are doing. These leads should dress through the loops of the block fanning strip to retain them in place.

- e. After all leads for the shelf are connected, verify all connections and solder defects.
- f. Remove the blocks from the wiring fixture and set them up into the wiring shelf in the same sequence as their final mounting appearance.
- g. The blocks can be "snapped" into their final mounting position after each module has been completed or near the end of each workday.
- h. Secure the cable form to the rear shelf fanning strip in at least 4 places. Use 2 strands of approved twine or nylon cable ties.
- i. After the shelf connecting blocks have been mounted in place, and the cable form has been secured to the rear shelf fanning strip, dress the cable leads into a flat "S" type curve so that they lay as flat as possible on the bottom of the shelf. This dress is required to allow the service observing cords to be

connected to the rear (cable side) terminals.

7.4 Connecting (Rear Side)

7.4.1 Terminating the cable leads to the 78C-Type connecting blocks from the rear side of the frame is considered as an alternate method to front side connecting. For the method of temporarily mounting the connecting blocks on the R-451 Wiring Fixture, refer to Figure 8. The procedures listed below should be followed for rear side connecting:

- a. Fasten the R-4451 Wiring Fixture to the service observing cord brackets located on the shelf immediately above the shelf being connected. That is, if the blocks for shelf 6 are being connected, mount the wiring fixture to the rear brackets of shelf 5.
- b. The following difficulty will be encountered when connecting from the rear side of the frame. Even though all blocks can be mounted on the R-4451 Wiring Fixture, the last 5 rows at each end cannot be connected due to the frame upright flanges; therefore, it would be expedient to completely connect the block farthest from the main form first, remove it from the wiring fixture and place it on the shelf. Then set up the rest of the blocks clear of the flange and finish connecting them.
- c. After the cable leads have been fanned through the rear fanning strip, as described in Paragraphs 7.2.1.1 through 7.2.1.3, start bringing the leads into the connecting blocks.
- d. Refer to field laid-out connecting sheets or the CCED or JWF, Regionally furnished connecting sheet and then form, fan, and connect the leads accordingly. Check to be sure these sheets agree with Table B and Figure 7. It appears that starting at the bottom row and working left to right is the easiest method. Remember that the block is mounted in an upside down position.
- e. After all leads for the shelf have been connected, verify the connections and solder all defects prior to permanent mounting.
- f. After the blocks have been mounted, dress all the cable leads into a flat "S" type curve and press them down flat against the bottom of the shelf to allow for service observing cord connections to the rear (cable side) of the terminals.

7.4.2 The R-4452 L2 Wiring Fixture has been redesigned to hold a single 78 or 112 Type Connecting block. The fixture mounts on the front between shelves, see Figure 9. This fixture can be used when adding to a partial shelf or wiring blocks for a full shelf. The

use of the fixture eliminates having to secure to blocks with twine.

7.5 Storing Unused Leads

7.5.1 The unused leads of a cable serving a particular connecting block(s) shall be left long enough to reach the ultimate termination of the block(s) being served. These leads should be wrapped around 2 or 3 loops of the rear fanning strip behind the connector block(s) being served. By separating the unused leads of each cable it will make identification feasible if the leads are ever required in the future.

8. SERVICE OBSERVING JACK PANEL

8.1 The S.O. Jack Panels (100 jacks per panel) should be mounted on the rear of the line equipment modules as shown on drawing ED-6C081-10. Each line equipment module has the capability of mounting 6 jack panels, 3 on each side of the flange separating the halves of the line equipment module. When only 1 jack panel is to be installed, it should be mounted on the left side of the flange looking at the module from the rear side. For further mounting information, refer to drawing ED-6C081-10, Figure 1.

8.1.1 The jack panel feeder cables (buss cables) are run on the rack above the frames. Each individual cable feeding a jack panel within the module is spliced into this buss cable above the frame and dropped down into the module through a grommet hole located at the top of the frame. (Refer to Drawing ED-6C111-10 Figures 9A, 9B, and 13B.)

8.1.2 After the cable has been butt, stripped, and connected according to ED-6C081-10, the cable should be secured to the side of the S.O. cord brackets.

9. TEST-TALK SYSTEM

9.1 The Test-Talk panels are approximately 4" wide (replaces a 64 pair connector block) and should be located on shelf five. However, refer to the front equipment layout for the exact locations. The cables feeding the Test-Talk System are common "buss" cables run in a similar manner to the S.O. Jack Panel Cables. The individual module "test-talk" panel cables are spliced into the common buss cables located above the frame (refer to ED-6C111-10 Figures 1A, 2A, 3A, and 4A) and enter the module in the same manner as the connecting block cables.

9.1.1 The leads for these panels should be connected from the front side using the R-4452 Wiring Fixture. Mount the R-4452 Fixture as shown in Figure 9, slide the panel to be wired in place and connect leads. When the panels are properly positioned in the fixture, remember that they will be in an upside down position so exercise caution when connecting especially the solderless wrapped connections.

10. CROSS-CONNECTIONS

10.1 General

10.1.1 The 78C Type Connecting Blocks have twin clip quick-connect terminals for terminating the DT24P Jumper Wires. The 112 Type Connecting Blocks have a three-beam, quick-connect terminal for terminating the Jumper Wires. The 756C2 is currently the only tool approved for terminating the jumper wires in these terminals. The 756C3 and 950A Tools will be available shortly. These will then be the only approved tools. Refer to Figure 12 for use. The inadvertent use of other tools will cause poor connections, opens, nicked wires, or other wire damage.

10.1.2 The 756C2 tool does not have a cutoff blade; therefore, the jumper leads must be cut to the proper length prior to termination. After leads have been cut to length, insert either the tip or ring lead into the upper or lower hole in the face of this tool (no stripping required), bend it across the tool face, and proceed to terminate. See Section 340 of Handbook 9 for further terminating information.

10.2 If WE installation is to do the jumper running operation, the cross-connecting information should be provided on job site by the Operating Company at least 3 weeks (minimum) prior to turnover date.

10.3 Procedures - Jumper running on the "COSMIC" and "COSMIC II" distributing frames shall follow the procedures listed below: (See Figure 10 and ED-6C114-10.)

- a. On the 78 type blocks, the bottom clip of the "twin clip" assembly is the preferred clip to be used. This lower clip is on the left side of the assembly; therefore, leads terminating in it should be dressed to the left side. However, if the top clip is used, which is on the right side of the assembly, the leads dress to the right. (See Figure 11.)
- b. On the 112 type block, the top slot of the quick-connect clip is preferred. If the top slot is used, leads dress to the left; if the bottom slot is used, the leads dress to the right. (See Figure 12.)
- c. When a jumper pair terminates on either row 1 or 2 of Shelves 2 through 10, or on Shelf 11, the jumper pair must enter through the top fanning strip of the block being served.
- d. When a jumper pair terminates on either Row 3 or 4 of Shelves 2 through 10, or on Shelf 1, the jumper pair must enter through the bottom fanning strip of the block being served.
- e. Do not use the upper or lower express troughs for jumpers run between adjacent modules.

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- f. When jumper are run between non-adjacent modules, the express troughs must be used.
- g. The jumpers must use the upper express trough when the point of origin (beginning of jumper run) is located on Shelves 1 through 5 or on the top two rows of blocks located of Shelf 6 (upper half of frame).
- h. The jumpers must use the lower express trough when the point of origin is located on Shelves 7 through 11 or on the bottom 2 rows of blocks located on Shelf 6 (lower half of frame).
- i. When jumpers are run from point "A" to point "B" (refer to Figure 10) using the express trough, enter the express trough from the vertical trough adjacent to the module containing point "A" heading toward point "B." Do not cross vertical troughs. The jumper MUST leave the express trough at the vertical trough preceding the module containing point "B." Do not run beyond point "B" and come back.
- j. When entering or leaving the express troughs, do not use the jumper support bars located directly above these vertical troughs. These support bars are used to support jumpers passing over the vertical troughs.
- k. Slack in a jumper run must be 16" to 20" dressed back into the shelf at the ends of the run. A convenient method of obtaining the 16" of required slack is to measure down to the bottom of a block 2 shelves below or measure up to the top of a block 2 shelves above. Figure the face of each connecting block and each jumper wire shelf at 4" in height to obtain the desired slack length.

11. PROBLEM AREAS

11.1 Broken Fanning Strips

11.1.1 In many cases the 78C-Type connecting blocks have been received on the job with broken fanning strips. When broken or cracked strips have been received, do not attempt to epoxy or glue the parts back together again. Refer to Table C and order replacement parts.

11.2 Cable Lead Dress

11.2.1 Some jobs have not properly dressed the cable leads down flat against the bottom of the shelf. Therefore, it was not possible to connect the service observing cords to the rear of the terminals. This has been a source of Operating Company complaints. Again, dress the leads into a flat "S" type curve and press them down against the bottom of the shelf.

Attachment:

Tables A through C.
Figures 1 through 12.

Reason for Reissue:

Added: Use of R-4452 Wiring Fixture,
112 Type Blocks. General updating.

TABLE A. VERIFICATION

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENT	REFERENCE	
	PAR. NO.	FIG. NO.
<u>Cable Protection</u>		
Cables protected where they bend sharply around or across metal-work.	1.4.1	
Where cables drop off ladder type rack for 3" or more protect with P-328952 Insulator.	1.4.2	
Where cables pass over or through cross straps protect with cut P-68616 Fiber.	1.4.2	
<u>Cable Securing</u>		
Secure cables to last strap of 5" rack prior to entering frame vertical cable trough.	1.5.2.1	
<u>Reel Verification</u>		
Verify cable on reel agrees with reel tag.	1.6.1	
<u>Nylon Cable Ties</u>		
Refer to Handbook 9, Section 205 for methods and requirements.	3.3.4	
<u>Butting and Stripping</u>		
Refer to Handbook 8, Sections 400 and 410.	4.1.1	
<u>Connecting</u>		
Apparatus, methods, and requirements for (SWC) per Handbook 9, Sections 310 and 314.	5.1.1	
<u>Protector Frame</u>		
Horizontal cable arms secured to weld pins and banded or sewn with twine or R-4265 Nylon Cable Ties	6.1.2	
Dress Connector Form in neat workmanship manner.	6.2.2j	2
<u>"COSMIC" Modules</u>		
All cables butted approximately 1-1/2" below top bracket and secured with twine.	7.1.2	
Cable arms banded with twine or nylon cable ties at breakout points.	7.1.3	4
Use R-4254 Detail 4 Insulators on lower 3 straps of vertical trough - secure form with twine or nylon cable ties.	7.1.4	
Secure cable form to the rear shelf fanning strips in at least 4 places.	7.3.3h	
Dress cable leads into a flat "S" type curve at the bottom of the shelf.	7.3.1 7.3.3i	
Unused leads left long enough to reach furthest point.	7.5.1	

TABLE B. ASSIGNMENT OF CABLE LEADS FOR THE 302 CONNECTOR

	(76)	(51)	(26)	(01)	CKTS
BINDERS	R - T	R - T	R - T	R - T	ROW
BLUE	BL 1/2 Y	BL 1/2 BK	BL 1/2 R	BL 1/2 W	1
	O 1/2 Y	O 1/2 BK	O 1/2 R	O 1/2 W	2
	G 1/2 Y	G 1/2 BK	G 1/2 R	G 1/2 W	3
	BR 1/2 Y	BR 1/2 BK	BR 1/2 R	BR 1/2 W	4
	S 1/2 Y	S 1/2 BK	S 1/2 R	S 1/2 W	5
ORANGE	BL 1/2 Y	BL 1/2 BK	BL 1/2 R	BL 1/2 W	6
	O 1/2 Y	O 1/2 BK	O 1/2 R	O 1/2 W	7
	G 1/2 Y	G 1/2 BK	G 1/2 R	G 1/2 W	8
	BR 1/2 Y	BR 1/2 BK	BR 1/2 R	BR 1/2 W	9
	S 1/2 Y	S 1/2 BK	S 1/2 R	S 1/2 W	10
GREEN	BL 1/2 Y	BL 1/2 BK	BL 1/2 R	BL 1/2 W	11
	O 1/2 Y	O 1/2 BK	O 1/2 R	O 1/2 W	12
	G 1/2 Y	G 1/2 BK	G 1/2 R	G 1/2 W	13
	BR 1/2 Y	BR 1/2 BK	BR 1/2 R	BR 1/2 W	14
	S 1/2 Y	S 1/2 BK	S 1/2 R	S 1/2 W	15
BROWN	BL 1/2 Y	BL 1/2 BK	BL 1/2 R	BL 1/2 W	16
	O 1/2 Y	O 1/2 BK	O 1/2 R	O 1/2 W	17
	G 1/2 Y	G 1/2 BK	G 1/2 R	G 1/2 W	18
	BR 1/2 Y	BR 1/2 BK	BR 1/2 R	BR 1/2 W	19
	S 1/2 Y	S 1/2 BK	S 1/2 R	S 1/2 W	20
SLATE	BL 1/2 Y	BL 1/2 BK	BL 1/2 R	BL 1/2 W	21
	O 1/2 Y	O 1/2 BK	O 1/2 R	O 1/2 W	22
	G 1/2 Y	G 1/2 BK	G 1/2 R	G 1/2 W	23
	BR 1/2 Y	BR 1/2 BK	BR 1/2 R	BR 1/2 W	24
	S 1/2 Y	S 1/2 BK	S 1/2 R	S 1/2 W	25
	(100)	(75)	(50)	(25)	CKTS

TABLE C. FANNING STRIP REPLACEMENT

Connecting Blocks	Fanning Strip Color	Ordering Numbers	
		Top (Tab) Side	Bottom (Groove) Side
78C1A-50	White	841087901	841639909
78C1A-100	White	841087901	841639917
78C1B-50	Blue	841087919	841639925
78C1B-100	Blue	841087919	841639933
78C1C-100	Orange	841087943	841639966
78C3A-100	Green	841634777	841640014
78C2A-100	Green	841087927	841639941
78C1A-64	Yellow	841088081	841639974
78C2A-64	Yellow	841088099	841639982

NOTE: The Bottom (Groove) Side Fanning Strip has been redesigned to provide a fanning strip for both the cable and jumper sides. Order the correct strips to replace broken ones.

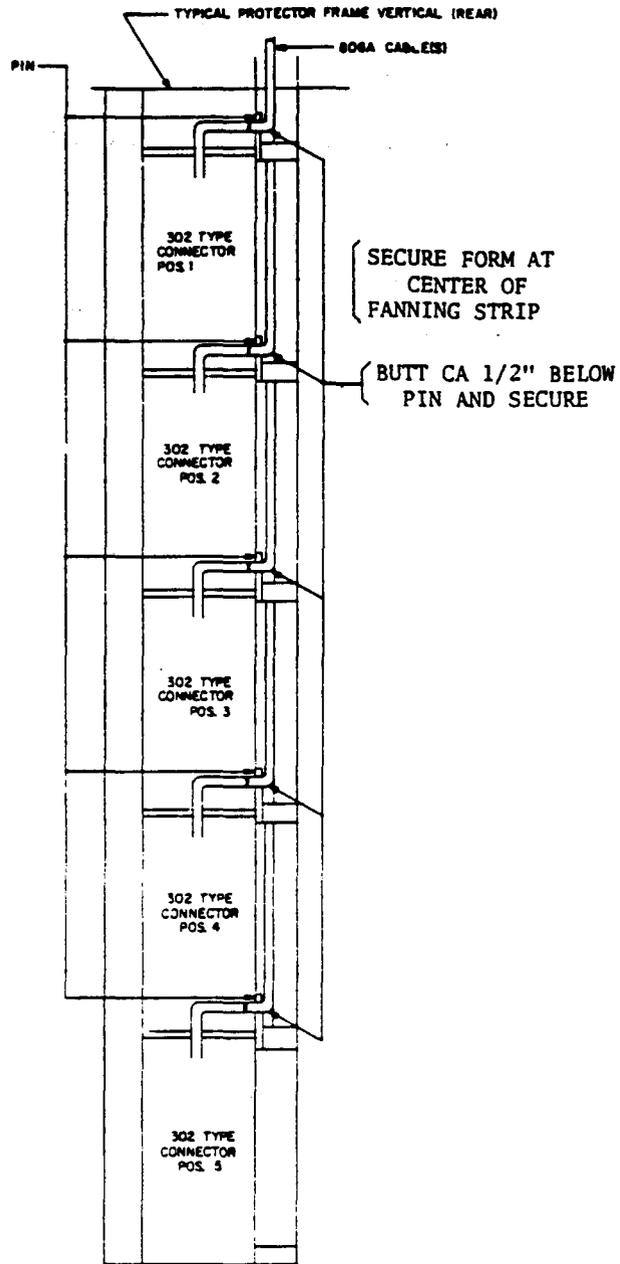


FIG. 1 TYPICAL BUTTING AND RUNNING OF CABLE AT EACH VERTICAL CONNECTOR POSITION

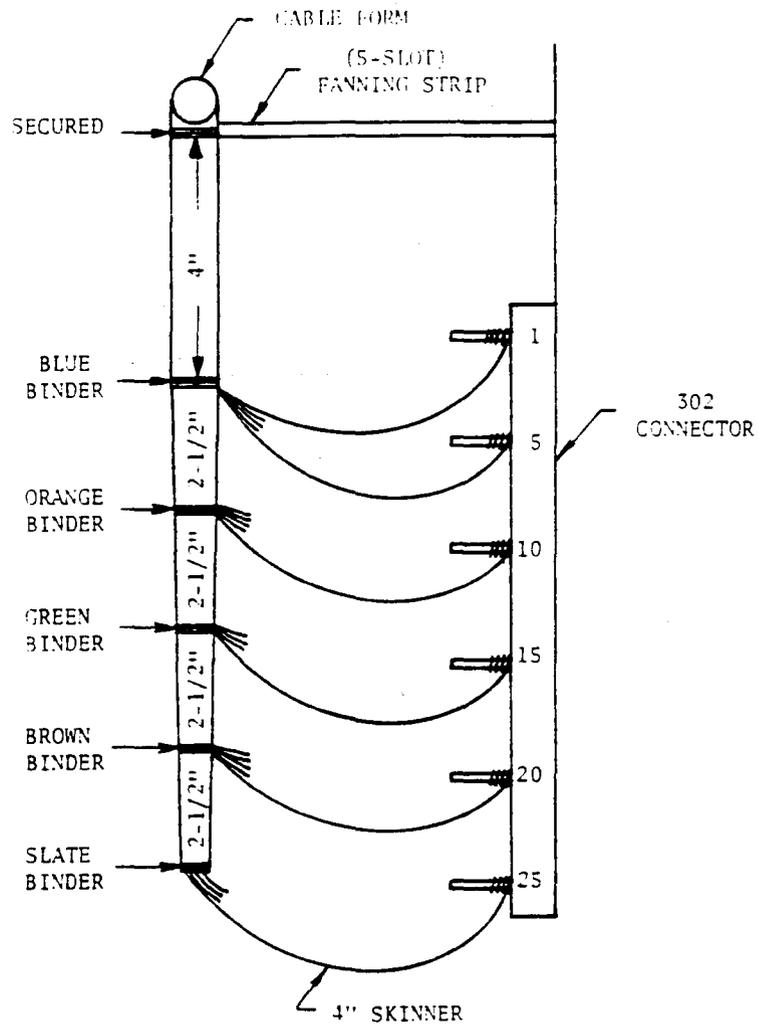


FIG. 2 302 CONNECTOR FORMING

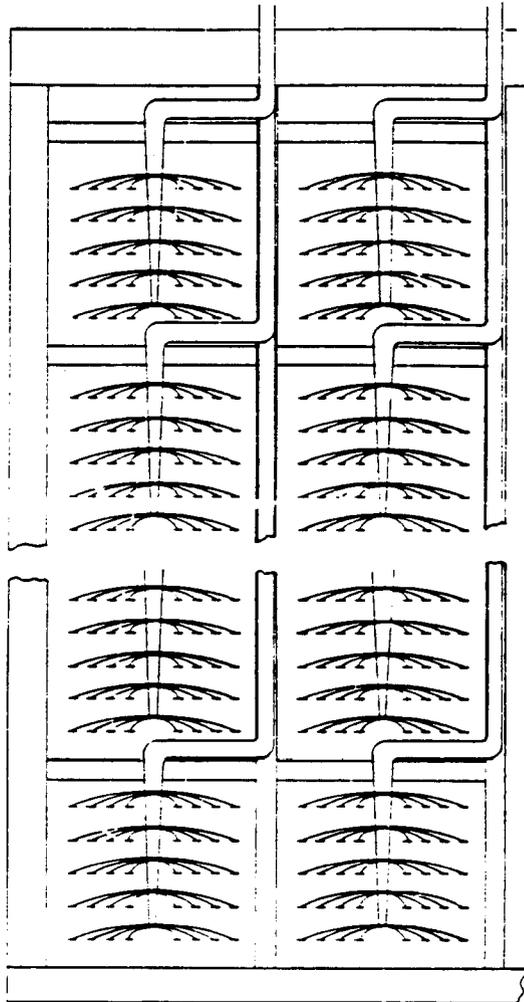


FIG. 3 TYPICAL METHOD OF DRESSING TIE CABLE TO 302 TYPE CONNECTORS ON PROTECTOR FRAME

NOTE: NUMBERS INDICATE SHELF NUMBER.



(VIEWED FROM REAR OF FRAME)
 FIG. 4 TYPICAL CABLE RACK LAYOUT WHEN CABLES WILL FORM TO THE RIGHT SIDE. REVERSE LAYOUT WHEN CABLES FORM LEFT. (PAR. 7.1.1)

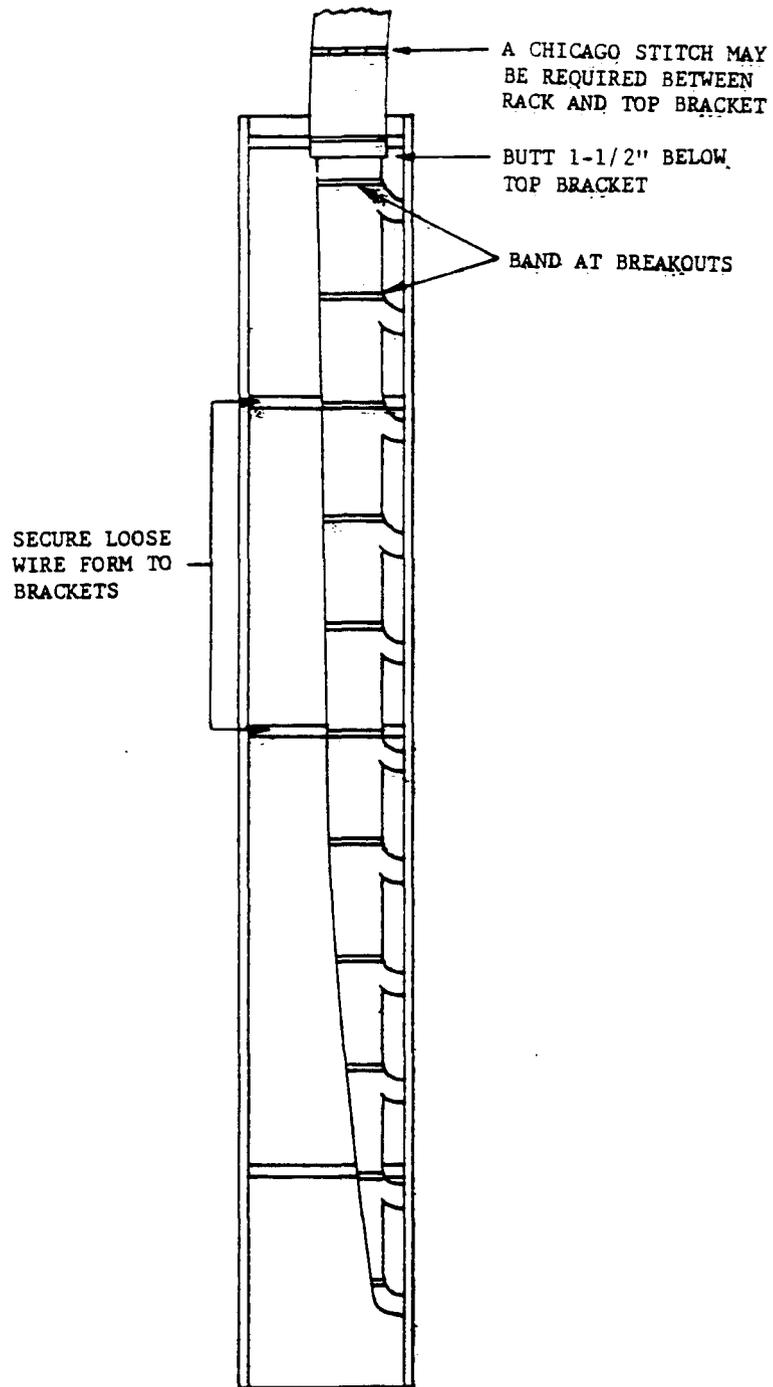
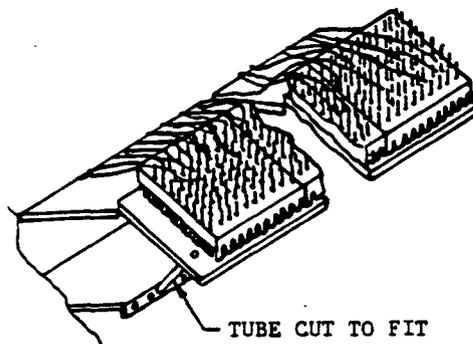


FIG. 5 CABLE FORMING AT "COSMIC" MODULES (PAR. 7.1.3)

CONNECTING AT FRONT SIDE OF FRAME



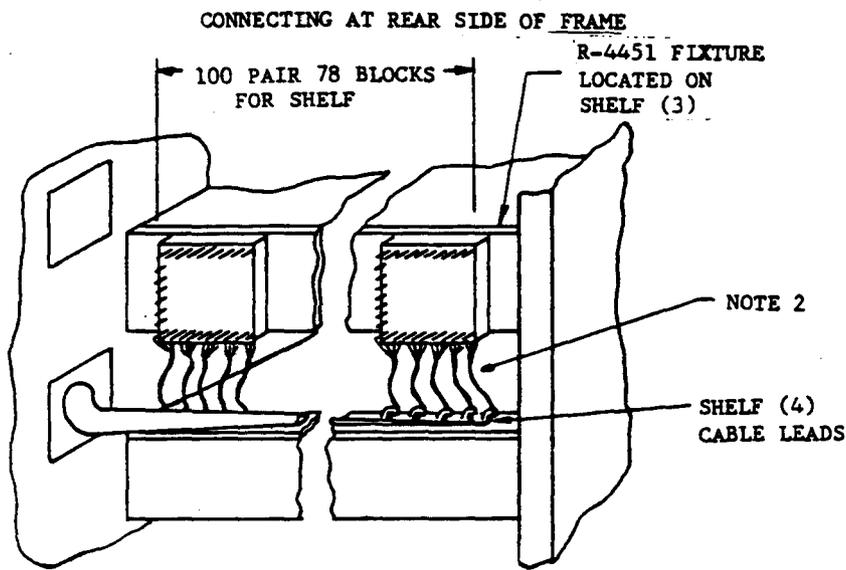
- NOTES:
1. MOUNT ADAPTER BAR ON BOTTOM EDGE OF SHELF TO BE CONNECTED.
 2. TUBES CUT TO FIT AND SECURED IN PLACE TO PROVIDE TILTING ANGLE.
 3. TEMPORARILY FASTEN ALL BLOCKS AS THEY WILL FINALLY APPEAR ON SHELF (WIRE WRAP TERMINALS TO THE FRONT).
 4. REMEMBER WHEN CONNECTING - THESE BLOCKS ARE IN AN UPSIDE DOWN POSITION.

FIG. 6

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HB 8 and 9
T R	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	
	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
T R	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	
	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	
T R	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	
	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	
T R	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	BL	O	G	BR	S	
	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
	BLUE					ORANGE					GREEN					BROWN					SLATE					
BINDERS																										CKT NOS.

FIG. 7

302 CONNECTOR CABLE LEAD ASSIGNMENT FOR "COSMIC"
DISTRIBUTING FRAME END



NOTES:

1. INSTALLER TO DETERMINE WHICH LOOPS OF THE FANNING STRIP TO USE. R-3412 MARKERS MAY BE REQUIRED FOR LEAD IDENTIFICATION.
2. DRESS LEADS AGAINST TERMINAL STRIP AS CLOSE AS POSSIBLE. REFER TO SECTION A-A OF DRAWING ED-6C011-10.
3. LEADS TO LAY AS FLAT AS POSSIBLE IN THE HORIZONTAL SHELF CHANNEL.
4. SPARE LEADS LEFT LONG ENOUGH TO REACH ULTIMATE TERMINALS. DRESS LEADS AROUND REAR FANNING STRIP AND SECURE IN PLACE.

FIG. 8

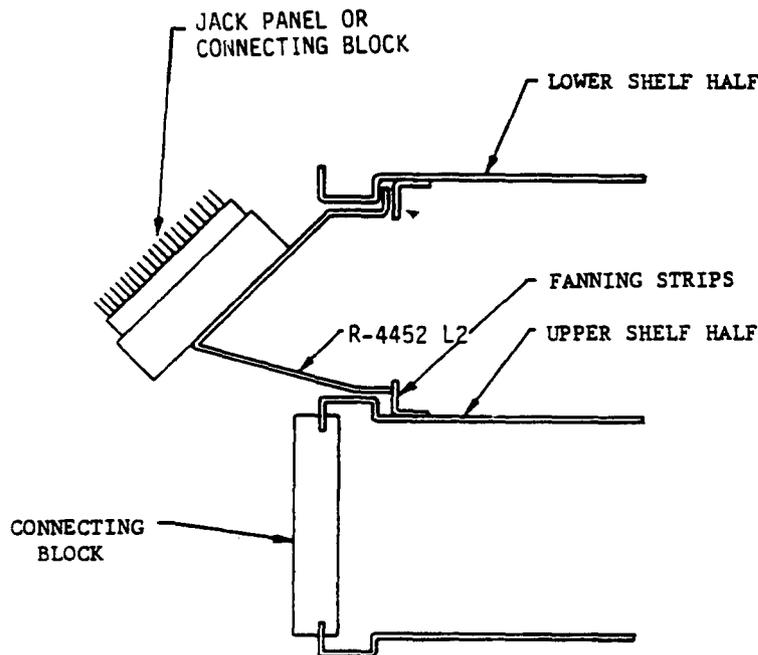


FIG. 9 TEMPORARY MOUNTING OF TEST-TALK PANELS

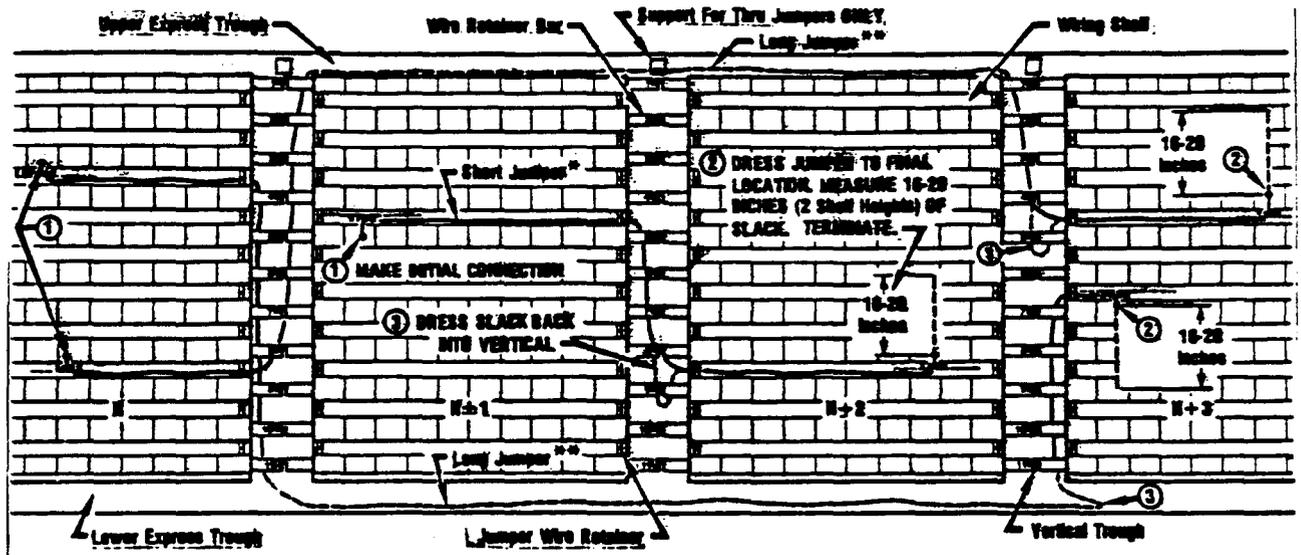


FIG. 10 METHOD OF RUNNING JUMPERS

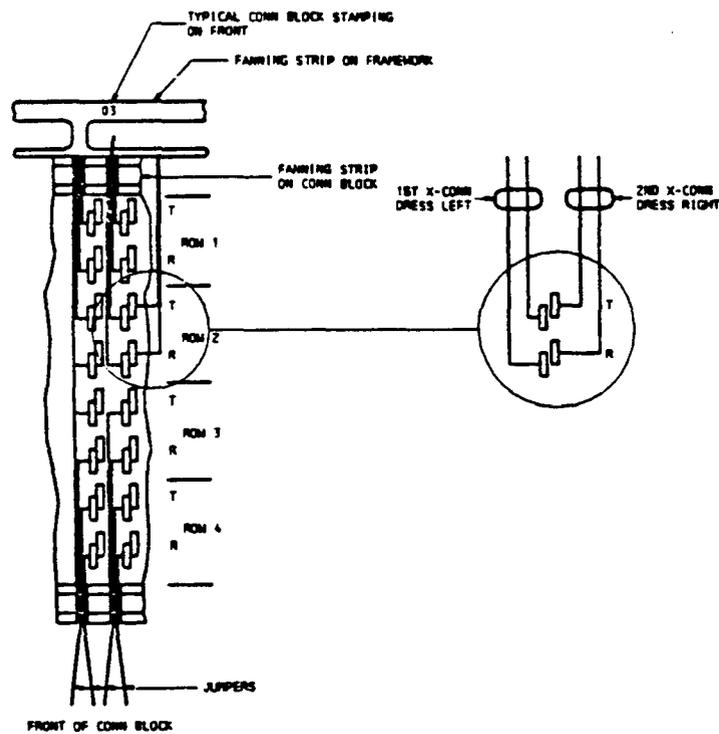


FIG. 11 METHOD OF DRESSING JUMPERS

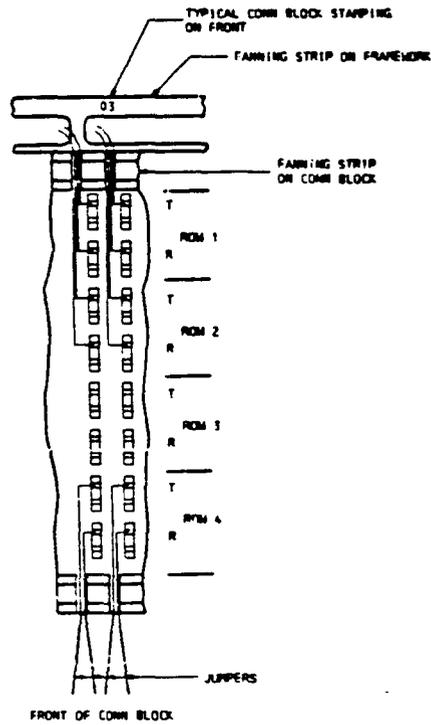
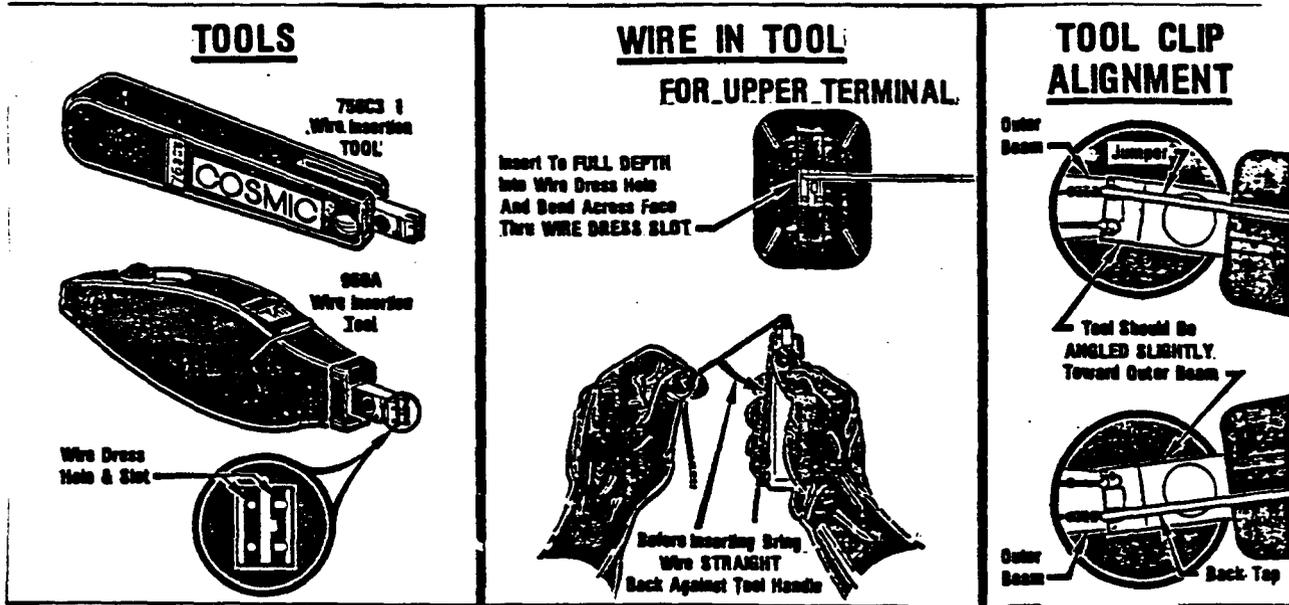


FIG. 12 METHOD OF DRESSING JUMPERS AND USE OF TOOLS ON 112 TYPE CONNECTING BLOCK.