



Telecenter IV Internal System Planning

RAULAND-BORG CORPORATION • 3450 West Oakton Street, Skokie, Illinois 60076-2951 • (708) 679-0900

TABLE OF CONTENTS	Page
Introduction	1
Introduction to System Planning	2
Plan Remote Locations	7
Assign Physical Numbers	8
Determine Hardware Requirements	9
Determine D.C. Power Requirements	10
System Planning Worksheet (blank form)	12
Physical Number Layout Planning Worksheet (blank form)	13

Introduction:

This manual is a guide for planning a Telecenter IV installation. Step-by-step procedures and worksheets are provided to enable a clear, concise, and comprehensive listing of requirements for use in ordering, system installation, and programming.

Because the Telecenter IV may or may not be connected to the public telephone network, the manual is divided into two parts: RI-1581, Internal System Planning; and, KI-1582, Interconnect Planning.

Only the information necessary to plan a system which does not interconnect to the public utility is included in this manual. No attempt is made to describe the system, the functions of its various components, or how to install, program, test, or troubleshoot the Telecenter IV. Refer to the appropriate System Manual for this information as required.

Introduction to System Planning

Summary: This section describes the **System Planning Worksheet**, which provides space for creating a clear, concise, and comprehensive listing of system requirements. Using it will help ensure a correct and successful cost estimate and provide a useful tool for use when ordering, installing, and programming the system. Read the following while reviewing the example to get a full understanding of the worksheet and how to complete it.

The System Planning Worksheet is divided into six major planning areas: Function, Remote Locations, Quantity (Qty.), TCIV Lines, Physical Numbers (Phys. #), and Cabling. An additional block at the bottom provides space for planning additional Display requirements. The following paragraphs explain each area and how it should be completed.

FUNCTIONS: Functions are chosen according to the operational features desired by the customer. They establish the requirements for Remote Location and TCIV Line hardware. Space is provided so that four different Staff functions (A, B, C, D) can be defined on one sheet. This should be enough in most cases. Definitions and special notes should be written on the worksheet where ever appropriate.

REMOTE LOCATIONS: These are the stations where people use Phones, Speakers, and Switches to perform a function associated with a single line. In the example, a **1** in any **Phone** or **Speaker** block indicates one unit is required at each remote location. **Switches** are designated by type **E** (Emergency), **N** (Normal), and **P** (**Privacy**). A horizontal line indicates the item is not needed in the example system. **Shaded areas** indicates the option doesn't apply in any system. (i.e., Speakers and Switches cannot be on the same line as a Call Control Console or Key Phone and TC4160 VCM's and TC4171 COA's require TCIV lines but they are not used by people at remote locations).

Phones: The example system uses several types of phones to support a variety of functions. It includes a Display Phone, three Key Phones, an Administrative Phone, and twenty Multi-Link Staff Phones. (Note: Multi-link phones can be identified by looking at their LLM and Physical Number requirements. Only multi-link staff phones require one LLM line and one physical number each.) Another Staff Function (Staff-D) could be specified for single-link staff phones and only one physical number would be required for all of them. However, each of them would use a Phone SCC25 line.

Speaker: The example system requires 43 speakers. One at each remote location performing a Staff function (A, B, or C).

Switch: The example system requires 15 Normal and 15 Emergency switches: one of each type of switch at each remote location performing the **Staff - B** function.

QUANTITY: (QTY.): This is the total number of each type of Function required. In the example system there is: 1 Display Phone, 8 **Staff - A** stations (each requiring a speaker), 15 **Staff - B** stations (each requiring a speaker with a normal and an emergency call-in switch), and 20 **Staff - C** stations (each requiring a phone and speaker). There are also 6 Central Office Trunks and 3 Key Phones.

TCIV LINES: This is where you determine the **Phone** and **Speaker** hardware required to meet the needs determined by the number and types of Functions and Remote Locations.

Phone equipment is required to support telephone and hands-free intercom paths. The amount of hardware required is determined by the number of TC4 150 Line-Link Module

System Planning Worksheet

Installation: _____ [EXAMPLE] _____

Distributor: _____

Function	Remote Locations				TCIV LINES			Phys. #	Cable Req.	
					Phone		Speaker			
	Phones	Speakers	Switches	Qty.	LLM TC4150	SCC25 TC4120	SC25 TC4110			
System (TC4001)					5			0-4		
Display Phone (TC4211)	1	—	—	1	1			5	A,C	
VCM2 (TC4160)					—			—		
Control Console (TC4400)	—				—			—	D	
C.O.Trunk COA (TC4171)					6	6			6-11	C
Key Phone	1				3	5			12-16	
Admin Phone	1	—	—	10	10	—	—	17-26	C	
Staff - A Corridor Speakers	—	1	—	8	—	—	8	16-23	A	
Staff - B Speaker & Call Switches	—	1	E & N	15	—	—	15	47-61	B	
Staff - C Phone & Speaker	1	1	—	20	20	—	20	27-46	A,C	
Staff - D	—	—	—	—	—	—	—	—	—	

Note Switches by function:

- N = Normal Call-in
- E = Emergency Call-in
- P = Privacy

Display	Quantity
VFD (TC4200)	
GAM (TM432)	

Note Cabling by type:

- A = Shielded Pair
- B = 3 Conductor Shielded
- C = Twisted Pair
- D = 3 Shielded Pair

(LLM) lines and TC4120 (SCC25) Speaker Control lines needed. In the example, there are no requirements for SCC25s, indicating that there are no single-link staff phones in the system. However, the example does require, 47 LLM lines (5 for the System, 1 for the Display Phone, 6 for the Trunks/COAs, 5 for the 3 Key Phones, 10 for the Administrative Phones, and 20 for the Staff - C locations). Note that in this example, all three key phones get the same five line. If each of the three key phones had one unique line, they would require 7 LLM lines (4 common and 3 unique lines).

Speaker equipment is required to support one-way communication paths for paging, time-zone signals, and other functions. The amount of hardware required is determined by the total number of TC4110 (SC25) Speaker Control lines needed. In the example system, 43 Speaker SC25 lines are required: 8 lines for the 8 Staff - A locations, 15 lines for the 15 Staff - B locations, and 20 lines for the 20 Staff - C locations. **(Note:** When determining SC25 and SCC25 requirements, do not exceed 2 amps A.C. (50W) through any single SC line.)

PHYSICAL NUMBER:

(Phys. #): This is where you list the set of physical numbers (P:) which will support each Function. Except for Key Phones and the TC4400 Call Control Console, the physical number range must be equal to the figure in the Quantity column. Physical numbers for Key Phones must be equal to the number of unique lines required. The System (P:0 - 4) and Display Phone (P:5) physical numbers are standardized and should not be changed. Physical number assignments for the example system are: Trunks/COA's (P:6 - 11), Key Phones (P: 12 - 16), Administrative Phones (P:17 - 26), Staff-A (P: 16 - 23), Staff - B (P:47 - 61), and Staff - C (P:27 - 46).

The system software uses physical numbers to keep track of the equipment **connected** to each line and to access attribute programming on how each line should be handled (see KI-1584 for the programming associated with physical numbers). **Assigning** physical numbers is one of the most complex and important parts of system design. The following paragraphs describe the mechanics of assigning physical numbers.

Physical numbers relate to pins on the SC25 and SCC25 (SC) and TC4150 LLM boards. They are assigned in groups of consecutive numbers which provide the required overlap **between LLM** and SC boards. This overlap is required when speakers and phones are placed at a staff location and required to work as a unit. However, when a multi-link phone is used without a speaker, the **speaker circuit may be used elsewhere for paging and zone-signalling. In the example, physical numbers 17 - 23 overlap in this manner (P: 16 - 23 are used for Staff A corridor speakers and P: 17 - 26 are used for Administrative Phones).**

A Physical Number Layout Planning Worksheet is provided at the back of this manual. It shows every physical number in the system and the relationship between physical numbers and pin numbers on LLM and SC boards. The Example Physical Number Layout Plan on the facing page shows these relationship for the example system. (Shaded bars have been drawn to show relationships at a glance. This could also be accomplished using colored pencils, to mention but one option.)

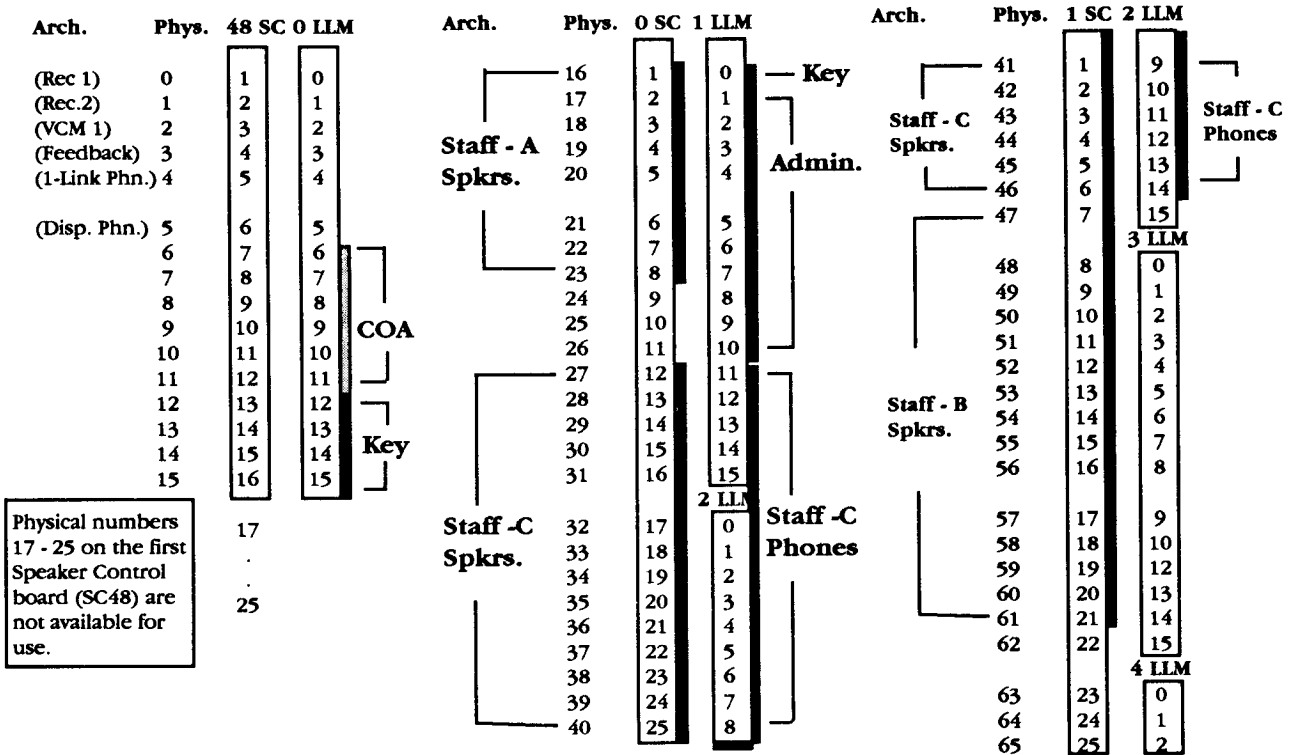
CABLING:

In this column, the type of cabling required between remote locations and the Telecenter cabinet is noted. Where possible, standard cable requirements are predesignated. Cabling for Key Phones is instrument dependent, as is cabling for Administrative and Staff functions. Cable types are noted according to the legend at the bottom right of the worksheet. (A for a shielded pair, B for 3 conductors with a shield, C for a twisted pair, and D for 3 shielded pairs). Cabling requirements can be determined using the Riser Diagram (KM0895).

DISPLAYS:

The box at the bottom of the worksheet provides space for recording TM432 Graphics Annunciator Module (GAM) and TC4200 Vacuum Fluorescent Display (VFD) requirements. These requirements are separately itemized because they do not require communication lines from either Line-Link Modules or Speaker Control Boards.

Example Physical Number Layout Plan



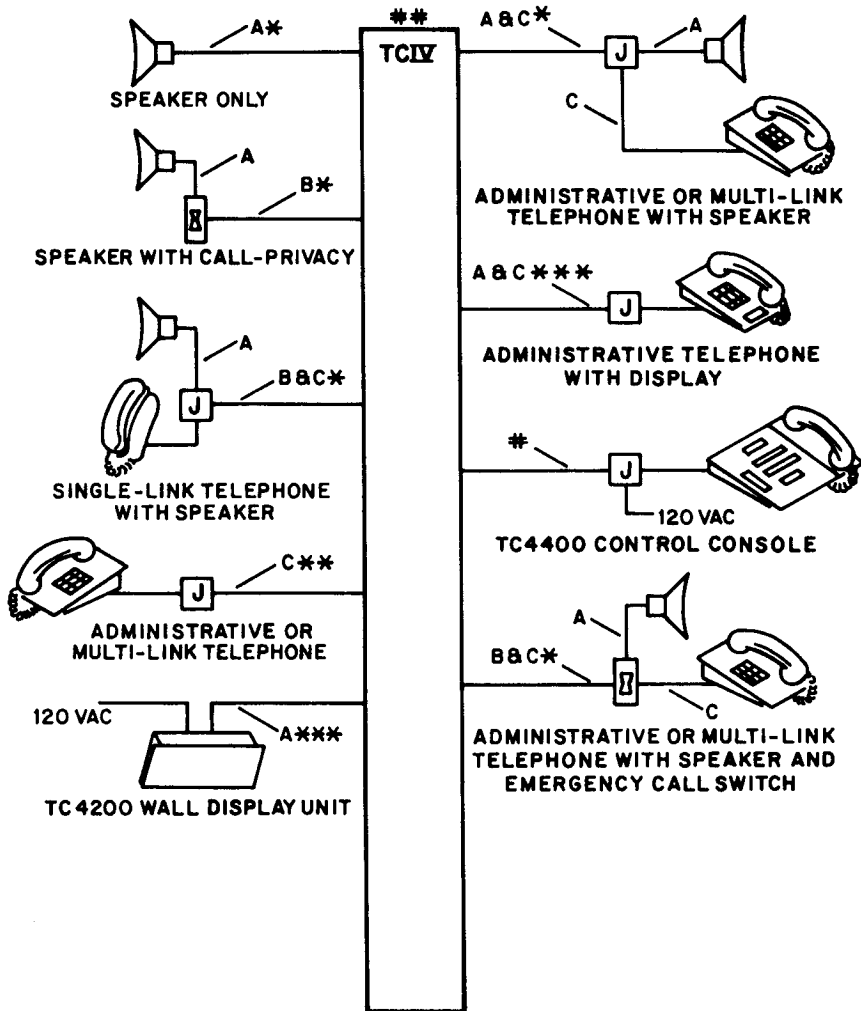
Caution:

The ## Architectural Number dialing feature, which allows loudspeaker communication through speakers associated with administrative phones, should not be used when the system is configured with administrative phones and unrelated speakers on the same physical numbers.

Legend:

- VCM = TC4160
- LLM = TC4150
- SC = TC4110 or TC4120

Riser Diagram



- * MAXIMUM DISTANCE
22 GA. 1500 FT.
20 GA. 2400 FT.
18 GA. 3800 FT.
 - ** MAXIMUM DISTANCE
22 GA. 2000 FT.
20 GA. 3200 FT.
18 GA. 5000 FT.
 - *** SHIELDED PAIR NOT TO EXCEED 1000 FT. TOTAL FOR UP TO 3 DISPLAYS
 - # THREE 22 GA. SHIELDED PAIRS MAXIMUM DISTANCE 1000 FT.
 - ** CONTACT SALES ENG. FOR SPECIAL WIRING PROBLEMS, SUCH AS NOT ENOUGH CONDUCTORS.
- CABLE TYPES**
 A - ONE SHIELDED PAIR
 B - THREE CONDUCTOR SHIELDED
 C - ONE TWISTED PAIR
- TC IV
RISER DIAGRAM**
 KM0895 0

* Maximum Distance
22 ga. 1500 ft.
20 ga. 2400 ft.
18 ga. 3800 ft.

** Maximum Distance
22 ga. 2000 ft.
20 ga. 3200 ft.
18 ga. 5000 ft.

***Shielded Pair
Do not exceed
1000 ft total
for up to 3 displays.

#Three 22 ga. Shielded Pairs
Maximum Distance
of 1000 ft.

##Contact Sales Engineering
for special wiring problems,
such as too few conductors.

Cable Types

A = One Shielded Pair
B = Three Conductor Shielded
C = One Twisted Pair

Plan Remote Locations

Summary: Use the **System Planning Worksheet** and complete the information required under headings: Function, **Remote Locations**, and **Quantity**. **This will** provide all the information necessary to determine the size and cost of the required system.

Step 1. Make a copy of the **System Planning Worksheet** and note on it any other information which will be useful during later stages of planning, installation, and programming (e.g., the name of the site, the contact person, phone number, etc.).

step 2. Obtain or create a scaled **diagram** showing the physical layout of the **customer's facility**, including: all rooms, hallways, doorways, entrances, exits, and parking areas, conference rooms, bathrooms, etc. This will be useful in achieving total coverage, for use as a **guide to the installer**, and for **estimating cabling costs**.

NOTE: While performing Steps 3 through 5, have a copy of the System Planning Worksheet and the scaled diagram at hand to ensure all options can be reviewed with the customer.

Step 3. Review the System Description and facility drawing with the customer to determine the following system requirements and complete the Function and Remote Locations areas of the System Planning Worksheet.

LCD Display phone: **These** are recommended for use as Attendant Phones and for system programming. A display phone may be coupled with a speaker and any combination of call-in switches.

VFD (Vacuum Fluorescent Displays): One VFD is required at each location staffed by Attendant stations which do not **have** display phones.

Note: LCD Drivers 1 and 2 can each drive up to 3 displays (LCD and VFD). **The** drive capability can be increased with buffers (contact Sales Engineering).

VCM: The TC4001 comes equipped with one VCM, supplying one intercom channel for use by all speakers. Additional VCMs must be installed if more than one intercom channel is desired. Note that only one VCM (one intercom channel) is allowed per Speaker Control board.

Administrative Phones: One is needed for each user who will dial calls and page.

Staff: Specify as many different types (A, B, C, etc.) of staff stations needed for the application and determine the number (Quantity) required of each. The following examples are from the previously discussed system:

Staff - A is a Stand-alone speaker for a corridor, etc.

Staff - B is a Stand-alone speaker with both Normal and Emergency switches for rooms with infrequent communication requirements.

Staff - C is a Multi-Link Staff Phone with speaker for rooms with frequent communication requirements.

Graphic Displays:

Use the following steps to determine graphic display requirements for one location. Double the figures obtained if a second location is required. Refer to the System Description and Programming Manuals (RI-1580 and RI-1584) for information on utilizing the graphic display drivers.

- A. Determine the total number of annunciated lines required and provide one GAM (TM432) for each set of thirty-two lines. Call-ins on any of these lines should light a lamp or LED.
- B. Determine the total number of monitored lines required and provide one GAM (TM432) for each set of thirty-two lines. A lamp or LED should light when any of these lines are in-use.
- C. Provide a pulse generator if a flashing indication is desired for either the annunciated or monitored lines. If both types of lines are required to flash, but at different rates, a pulse generator may be required for each.
- D. Design and obtain materials for a custom display panel, allowing mounting space for the TM432 modules.
- E. For each type of line (annunciated and monitored) provide a 34-conductor flat cable long enough to supply lamp driver signals to each GAM, plus enough slack for maintenance purposes. Also, provide one connector for each GAM and an additional connector for test purposes, if desired.
- F. Determine the power requirements and ensure local power is available. Provide back-up power if necessary.

Step 4. If interconnect is required:

Go to the Interconnect Planning Guide (KI-1582) to determine requirements for the TC4400 Call Control Console, Trunks/COAs, and Key Phones.

Step 5. Review the Riser Diagram and note all cabling requirements on the System Planning Worksheet.

Assign Physical Numbers

Physical numbers are used by system software to keep track of equipment **connected** to each of the 5 12 possible lines; therefore, each TC4150 Line Link Module (LLM) and each **TC4110 (SC25)** and TC4120 (SCC25) Speaker Control line in the system has a physical number. The first step in assigning physical numbers is determining how many lines are required from Line-Link Modules (LLM) and Speaker Control (SC) boards. Then, physical numbers can be assigned using the Physical Number Layout Worksheet.

step 1. Refer to the **Quantity column** of your **System Planning Worksheet** and enter the number of LLM lines required for each of the following:

TC4160 VCM	(additional VCM's only: VCM 1 has a dedicated LLM line.)
TC4400 Console	(1 LLM line is required for the Console)
Trunks/TC4171 COA's	(1 LLM line per trunk/COA)
Key Phones	(1 LLM line per unique Key Phone Line: Do not multiply by the number of Key Phones if they all use the same lines.)
Administrative	(1 LLM line per Administrative Phone)
Multi-Link Staff	(1 LLM line per phone: Refer to your Staff function definitions for the quantity of Multi-Link phones required.)

Step 2. A Phone SC line is required for each Single-Link Staff Phone. Refer to your definition of Staff **Functions** for the quantity of Single-Link phones required and enter that number on the appropriate function line under **Phone SCC25**.

Step 3. A **Speaker SC** line is required for each Speaker. Refer to the **Quantity column** of your **System Planning Worksheet** and enter the number of Speaker SC25 lines required for each function.

Step 4. Make a copy of the **Physical Number Layout Worksheet** and define a set of physical numbers for each function, keeping the following in mind:

Assign physical numbers in a way that makes maximum use of resources. This will help minimize system costs.

Group like equipment together and add physical numbers to allow room for system growth. This is especially important for Trunks/COAs, Administrative Phones, and Multi-Link Staff Phones because they use LLM lines, which are generally more limited in number than SC lines.

Use a colored pencil or some other method to code groupings of physical numbers by function. This graphic depiction will allow a quick assessment of free LLM and SC lines.

After completing the physical number assignment, determine if additional lines can be added to any of the groups from the unused lines at the end of the physical number range.

Determine Hardware Requirements

- Summary: The final step in system planning is determining what hardware is required to install and operate the system as designed. The TCIV System Ordering Guide should be completed in accordance with the following steps.
- Step 1. If speakers are to be used by a paging or audio programming source (e.g., Director Series) other than the Telecenter IV, determine the number and type of switch panels required (SW25 or SWT425) and order one TC4110 (SC25) for each.
- Step 2. Determine the total number of SCC25 Speaker Control boards required by subtracting the number of SC25s determined in Step 1 from the total number of Speaker Control boards required to meet the established physical number layout plan.
- Step 3. Determine the number of TC4140 LLM **expansion chassis required** by subtracting one (1) from the total number of LLMs required and dividing the remainder by Five (5). Increase the quotient to the next whole number if a fraction is obtained.
- Step 4. Determine the number of TC4165 **VCM** expansion chassis required by subtracting one (1) from the total number of VCMs required and dividing the remainder by four (4). Increase the quotient to the next whole number if a fraction is obtained.
- step 5. Determine Power Amplifier requirements for All Page by summing the output power requirements of all speakers in the system. Order a Power Amplifier which will meet current and anticipated needs.
- Step 6. Determine Power Amplifier requirements for Zone Page by summing the output power requirements of all speakers in each zone. Order a Power Amplifier which will meet current and anticipated needs of the zone with the highest power requirement.
- step 7. If more than one TC4160 VCM is required, determine power supply requirements using the following formula and the steps on the next page.
- Step 8. Provide lightning protectors for any lines which go outside the building (Drawing KM0714).

D.C. Power Requirement Formula

MI0 + CPU + MTGIO0				=	1.80
LLM	Number	_____	X	.08	= _____
Off-Hook Phones	Number	_____	X	.04	= _____
VCM2s:					
Idle	Number	_____	X	.30	= _____
2w	Number	_____	X	.66	= _____
12w	Number	_____	X	2.40	= _____
Total Amps				=	_____

Determine D.C. Power Requirements

Summary: The Telecenter IV standard 12 Vdc power supply is adequate unless unusual demands are placed on the system. Use the example shown below and complete the following steps to determine if additional power handling capacity is required.

The example represents a system with 5 TC4150 LLM's and 3 TC4160 VCMs. One 10 watt speaker is used and all others are under 2 watts each. It is assumed that at most 20 phones will be off-hook at once and that it is possible for three administrative phones to place simultaneous intercom calls (no idle VCM's).

The result of the computation (6.72 amps) indicates the TC400's built-in 5 amp power supply is insufficient. To install all three VCMs, a separate 4.0 amp regulated power supply is required.

- step 1.** Note the total number of TC4150 LLMs in the system in the formula for LLMs.
- step 2.** Estimate the maximum number of multi-link phones that may be off-hook at any given time. (32 off-hook phones will use all sixteen lines.) Note this number in the formula for Off-Hook Phones.
- Step 3.** Review the power rating of each speaker assigned to each VCM.
- Note the number of VCMs with all speakers rated at no more than than 2 watts in the formula for 2W VCMs.
- Note the number of VCMs with any speaker rated above 2 watts in the formula for 12w VCMs.
- step 4.** Estimate the maximum number of administrative phones that may make simultaneous intercom calls. Subtract this number from the total number of VCMs installed and note the remainder in the formula for IDLE VCMs.
- Step 5.** Perform the indicated calculations to determine the system total power requirement and plan for additional power if it exceeds 5 amps.

D.C. Power Requirement Formula (Example)

MIO + CPU + MTGIOO					=	1.80
LLM	Number	<u>5</u>	X	.08	=	<u>.40</u>
Off-Hook Phones	Number	<u>20</u>	X	.04	=	<u>.80</u>
VCM2s:						
Idle	Number	<u> </u>	X	.30	=	
2 w	Number	<u>2</u>	X	.66	=	<u>1.32</u>
12w	Number	<u>1</u>	X	2.40	=	<u>2.4</u>
 Total Amps					=	 <u>6.72</u>

System Planning Worksheet

Installation: _____

Distributor: _____

Function	Remote Locations				TCIV Lines			Phys. #	Cable Req.
					Phone		Speaker		
	Phones	Speakers	Switches	Qty.	LLM TC4150	SCC25 TC4120	SC25 TC4110		
System (TC4001)					5			0-4	
Display Phone (TC4211)					1			5	A,C
VCM2 (TC4160)									
Control Console (TC4400)									D
C.O.Trunk COA (TC4171)									C
Key Phone									
Admin Phone									C
Staff - A									
Staff - B									
Staff - C									
Staff - D									

Note Switches by function:

- N = Normal Call-in
- E = Emergency Call-in
- P = Privacy

Display	Quantity
VFD (TC4200)	
GAM (TM432)	

Note Cabling by type:

- A = Shielded Pair
- B = 3 Conductor Shielded
- C = Twisted Pair
- D = 3 Shielded Pair

Physical Number Layout Planning Worksheet

Arch.	Phys.	48 SC	0 LLM
REC.1	0	1	0
REC.2	1	2	1
VCM	2	3	2
FDBK	3	4	3
1Lnk	4	5	4
Dsp.Phn	5	6	5
	6	7	6
	7	8	7
	8	9	8
	9	10	9
	10	11	10
	11	12	11
	12	13	12
	13	14	13
	14	15	14
	15	16	15
These physical numbers cannot be used by the system.		17	
		18	
		19	
		20	
		21	
		22	
		23	
		24	
		25	

Legend	Instructions
<p>Arch. = Architectural Number Assign these numbers using this chart. These are commonly room numbers. Do not use numbers starting with digits used for one-button dialing (e.g., 0 or 9)</p>	<p>Select contiguous groups of physical numbers for each type of equipment, as shown in the example on Page 5 of the Internal System Planning Manual.</p>
<p>Phys. = Physical Number The number which identifies each line or node in the system. Each physical number is associated with particular pins on an LLM and an SC, as shown in this chart.</p>	
<p>SC = Speaker Control Board Both SC25 (TC4110) and SCC25 (TC4120) type speaker control boards are represented in this layout with the symbol SC. These boards are used for speakers and single-link staff phones.</p>	<p>Plan spare circuits for convenient future expansion, especially for trunks and attendant console lines, including monitored extensions.</p>
<p>LLM = Line Link Module (TC4150.) Multi-link phone boards.</p>	<p>Skip SC and LLM boards numbers as necessary to obtain the physical numbers required to meet system design needs. That is, you may use LLM boards 0, 5, and 9 without using 1, 2, 3, etc.</p>
	<p>Upon installation, the DIP switches on each LLM and SC board must be set to provide the proper identification for recognition by system software.</p>

Arch	Phys.	SC	LLM	Arch	Phys.	SC	LLM	Arch	Phys.	SC	LLM
		0 SC	1			1 SC				2 SC	
16		1	0	41		1	9	66		1	2
17		2	1	42		2	10	67		2	3
18		3	2	43		3	11	68		3	4
19		4	3	44		4	12	69		4	5
20		5	4	45		5	13	70		5	6
21		6	5	46		6	14	71		6	7
22		7	6	47		7	15	72		7	8
23		8	7	48		8	0	73		8	9
24		9	8	49		9	1	74		9	10
25		10	9	50		10	2	75		10	11
26		11	10	51		11	3	76		11	12
27		12	11	52		12	4	77		12	13
28		13	12	53		13	5	78		13	14
29		14	13	54		14	6	79		14	15
30		15	14	55		15	7	80		15	0
31		16	15	56		16	8	81		16	1
32		17	0	57		17	9	82		17	2
33		18	1	58		18	10	83		18	3
34		19	2	59		19	11	84		19	4
35		20	3	60		20	12	85		20	5
36		21	4	61		21	13	86		21	6
37		22	5	62		22	14	87		22	7
38		23	6	63		23	15	88		23	8
39		24	7	64		24	0	89		24	9
40		25	8	65		25	1	90		25	10

Physical Number Layout Planning Worksheet

Arch	Phys	SC 3 SC	LLM	Arch	Phys	SC 5 SC	LLM	Arch	Phys	SC 7 SC	LLM
	91	1	11		141	1	13		191	1	15
	92	2	12		142	2	14		192	2	0
	93	3	13		143	3	15		193	3	1
	94	4	14		144	4	0	9L	194	4	2
	95	5	15		145	5	1		195	5	3
	96	6	0	6L	146	6	2		196	6	4
	97	7	1		147	7	3		197	7	5
	98	8	2		148	8	4		198	8	6
	99	9	3		149	9	5		199	9	7
	100	10	4		150	10	6		200	10	8
	101	11	5		151	11	7		201	11	9
	102	12	6		152	12	8		202	12	10
	103	13	7		153	13	9		203	13	11
	104	14	8		154	14	10		204	14	12
	105	15	9		155	15	11		205	15	13
	106	16	10		156	16	12		206	16	14
	107	17	11		157	17	13		207	17	15
	108	18	12		158	18	14		208	18	0
	109	19	13		159	19	15		209	19	1
	110	20	14		160	20	0	10L	210	20	2
	111	21	15		161	21	1		211	21	3
	112	22	0	7L	162	22	2		212	22	4
	113	23	1		163	23	3		213	23	5
	114	24	2		164	24	4		214	24	6
	115	25	3		165	25	5		215	25	7
	116	1	4		166	1	6		216	1	8
	117	2	5		167	2	7		217	2	9
	118	3	6		168	3	8		218	3	10
	119	4	7		169	4	9		219	4	11
	120	5	8		170	5	10		220	5	12
	121	6	9		171	6	11		221	6	13
	122	7	10		172	7	12		222	7	14
	123	8	11		173	8	13		223	8	15
	124	9	12		174	9	14		224	9	0
	125	10	13		175	10	15		225	10	1
	126	11	14		176	11	0	11L	226	11	2
	127	12	15		177	12	1		227	12	3
	128	13	0	8L	178	13	2		228	13	4
	129	14	1		179	14	3		229	14	5
	130	15	2		180	15	4		230	15	6
	131	16	3		181	16	5		231	16	7
	132	17	4		182	17	6		232	17	8
	133	18	5		183	18	7		233	18	9
	134	19	6		184	19	8		234	19	10
	135	20	7		185	20	9		235	20	11
	136	21	8		186	21	10		236	21	12
	137	22	9		187	22	11		237	22	13
	138	23	10		188	23	12		238	23	14
	139	24	11		189	24	13		239	24	15
	140	25	12		190	25	14		240	25	0

Physical Number Layout Planning Worksheet

Arch	Phys	SC	LLM	Arch	Phys	SC	LLM	Arch	Phys	SC	LLM
241	1	9 SC	1	291	1	11 SC	3	341	1	13 SC	5
242	2		2	292	2		4	342	2		6
243	3		3	293	3		5	343	3		7
244	4		4	294	4		6	344	4		8
245	5		5	295	5		7	345	5		9
246	6		6	296	6		8	346	6		10
247	7		7	297	7		9	347	7		11
248	8		8	298	8		10	348	8		12
249	9		9	299	9		11	349	9		13
250	10		10	300	10		12	350	10		14
251	11		11	301	11		13	351	11		15
252	12		12	302	12		14	352	12		0
253	13		13	303	13		15	353	13		1
254	14		14	304	14		0	354	14		2
255	15		15	305	15		1	355	15		3
256	16		0	306	16		2	356	16		4
257	17		1	307	17		3	357	17		5
258	18		2	308	18		4	358	18		6
259	19		3	309	19		5	359	19		7
260	20		4	310	20		6	360	20		8
261	21		5	311	21		7	361	21		9
262	22		6	312	22		8	362	22		10
263	23		7	313	23		9	363	23		11
264	24		8	314	24		10	364	24		12
265	25		9	315	25		11	365	25		13
266	1	10 SC	10	316	1	12 SC	12	366	1	14 SC	14
267	2		11	317	2		13	367	2		15
268	3		12	318	3		14	368	3		0
269	4		13	319	4		15	369	4		1
270	5		14	320	5		0	370	5		2
271	6		15	321	6		1	371	6		3
272	7		0	322	7		2	372	7		4
273	8		1	323	8		3	373	8		5
274	9		2	324	9		4	374	9		6
275	10		3	325	10		5	375	10		7
276	11		4	326	11		6	376	11		8
277	12		5	327	12		7	377	12		9
278	13		6	328	13		8	378	13		10
279	14		7	329	14		9	379	14		11
280	15		8	330	15		10	380	15		12
281	16		9	331	16		11	381	16		13
282	17		10	332	17		12	382	17		14
283	18		11	333	18		13	383	18		15
284	19		12	334	19		14	384	19		0
285	20		13	335	20		15	385	20		1
286	21		14	336	21		0	386	21		2
287	22		15	337	22		1	387	22		3
288	23		0	338	23		2	388	23		4
289	24		1	339	24		3	389	24		5
290	25		2	340	25		4	390	25		6

Physical Number Layout Planning Worksheet

Arch	Phys	S C	L L M	Arch	Phys	S C	L L M	Arch	Phys	S C	L L M
		15 SC									
	391	1	7								
	392	2	8								
	393	3	9								
	394	4	10								
	395	5	11								
	396	6	12								
	397	7	13								
	398	8	14								
	399	9	15								
	400	10	0	25L							
	401	11	1								
	402	12	2								
	403	13	3								
	404	14	4								
	405	15	5								
	406	16	6								
	407	17	7								
	408	18	8								
	409	19	9								
	410	20	10								
	411	21	11								
	412	22	12								
	413	23	13								
	414	24	14								
	415	25	15								
		16 SC									
	416	1	0	26L							
	417	2	1								
	418	3	2								
	419	4	3								
	420	5	4								
	421	6	5								
	422	7	6								
	423	8	7								
	424	9	8								
	425	10	9								
	426	11	10								
	427	12	11								
	428	13	12								
	429	14	13								
	430	15	14								
	431	16	15								
	432	17	0	27L							
	433	18	1								
	434	19	2								
	435	20	3								
	436	21	4								
	437	22	5								
	438	23	6								
	439	24	7								
	440	25	8								
						17 SC					
	441				441	1	9				
	442				442	2	10				
	443				443	3	11				
	444				444	4	12				
	445				445	5	13				
	446				446	6	14				
	447				447	7	15				
	448				448	8	0	28L			
	449				449	9	1				
	450				450	10	2				
	451				451	11	3				
	452				452	12	4				
	453				453	13	5				
	454				454	14	6				
	455				455	15	7				
	456				456	16	8				
	457				457	17	9				
	458				458	18	10				
	459				459	19	11				
	460				460	20	12				
	461				461	21	13				
	462				462	22	14				
	463				463	23	15				
	464				464	24	0	29L			
	465				465	25	1				
	466				466	1	2				
	467				467	2	3				
	468				468	3	4				
	469				469	4	5				
	470				470	5	6				
	471				471	6	7				
	472				472	7	8				
	473				473	8	9				
	474				474	9	10				
	475				475	10	11				
	476				476	11	12				
	477				477	12	13				
	478				478	13	14				
	479				479	14	15				
	480				480	15	0	30L			
	481				481	16	1				
	482				482	17	2				
	483				483	18	3				
	484				484	19	4				
	485				485	20	5				
	486				486	21	6				
	487				487	22	7				
	488				488	23	8				
	489				489	24	9				
	490				490	25	10				
										19 SC	
	491				491	1	11				
	492				492	2	12				
	493				493	3	13				
	494				494	4	14				
	495				495	5	15				
	496				496	6	0	31L			
	497				497	7	1				
	498				498	8	2				
	499				499	9	3				
	500				500	10	4				
	501				501	11	5				
	502				502	12	6				
	503				503	13	7				
	504				504	14	8				
	505				505	15	9				
	506				506	16	10				
	507				507	17	11				
	508				508	18	12				
	509				509	19	13				
	510				510	20	14				
	511				511	21	15				
						22					
						23					
						24					
						25					

(End of
phys. nos.)

Not
accessible
by the
system.