TONE COMMANDER.
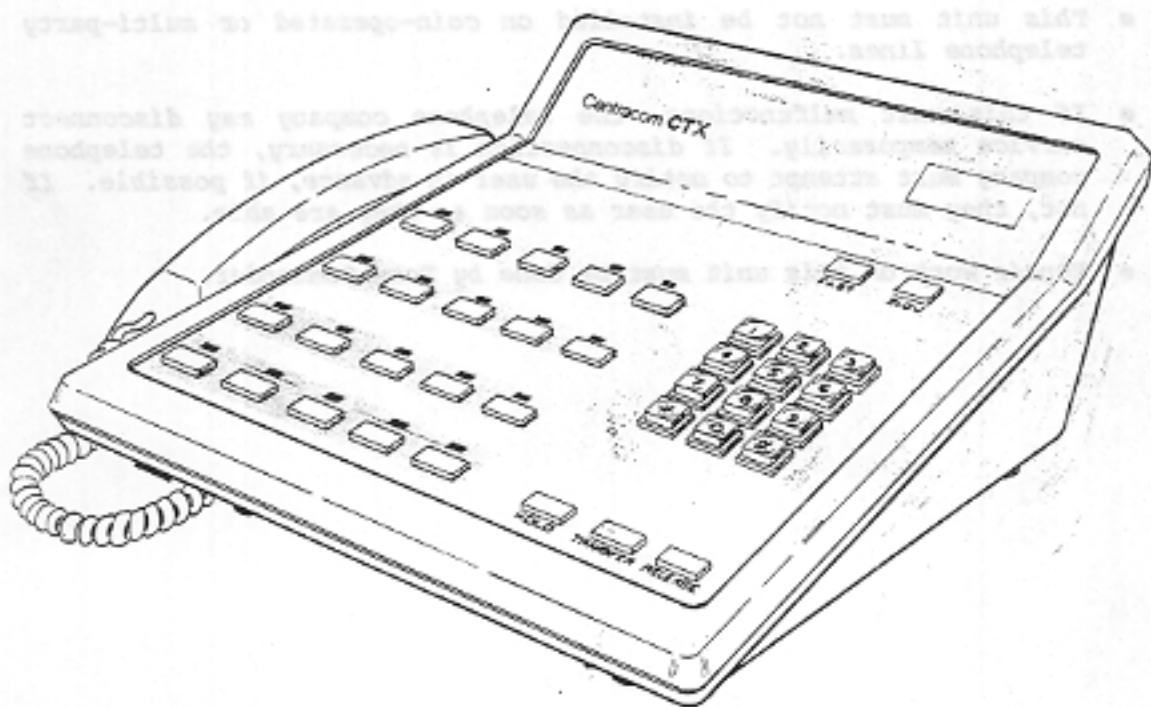
Box 97039 ● 4320 150th Avenue NE
Redmond, WA 98073-9739 USA
Phone: (206) 883-3600   Telex: 15-2246

CENTRACOM® CTX

INSTALLATION
INSTRUCTIONS

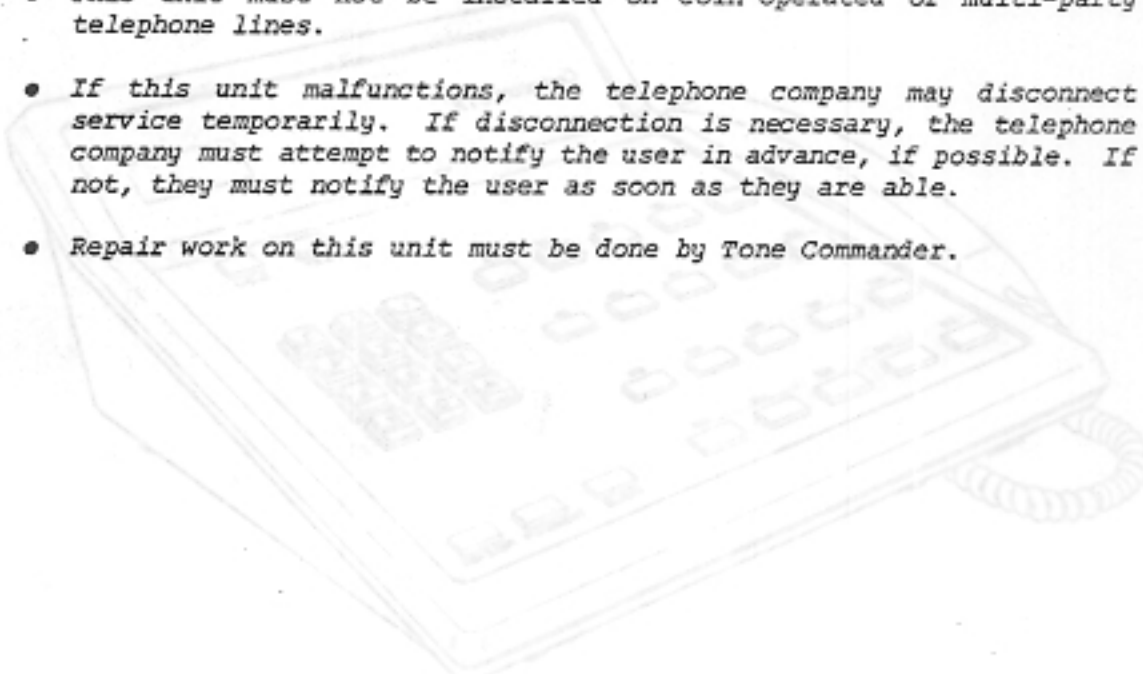Doc. #13-102013 Rev. A
September 1986

FCC REQUIREMENTS

To comply with Federal Communications Commission (FCC) regulations, the following requirements must be met:

- The FCC registration number of this unit (AHI9V9-14483-MT-T) and the Ringer Equivalance (0.4A) must be reported to the telephone company.

- This equipment complies with the requirements in Part 15 of FCC Rules for a "Class A" computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the user to take whatever steps are necessary to correct the interference.

- This unit must be installed by telephone company personnel or agents authorized by Tone Commander under Part 68 of FCC Rules and Regulations.

- This unit must not be installed on coin-operated or multi-party telephone lines.

- If this unit malfunctions, the telephone company may disconnect service temporarily. If disconnection is necessary, the telephone company must attempt to notify the user in advance, if possible. If not, they must notify the user as soon as they are able.

- Repair work on this unit must be done by Tone Commander.
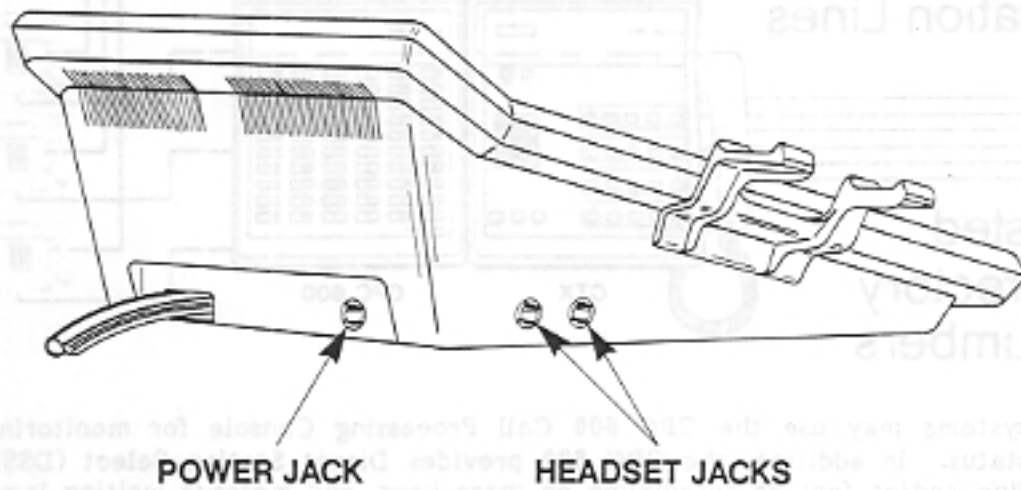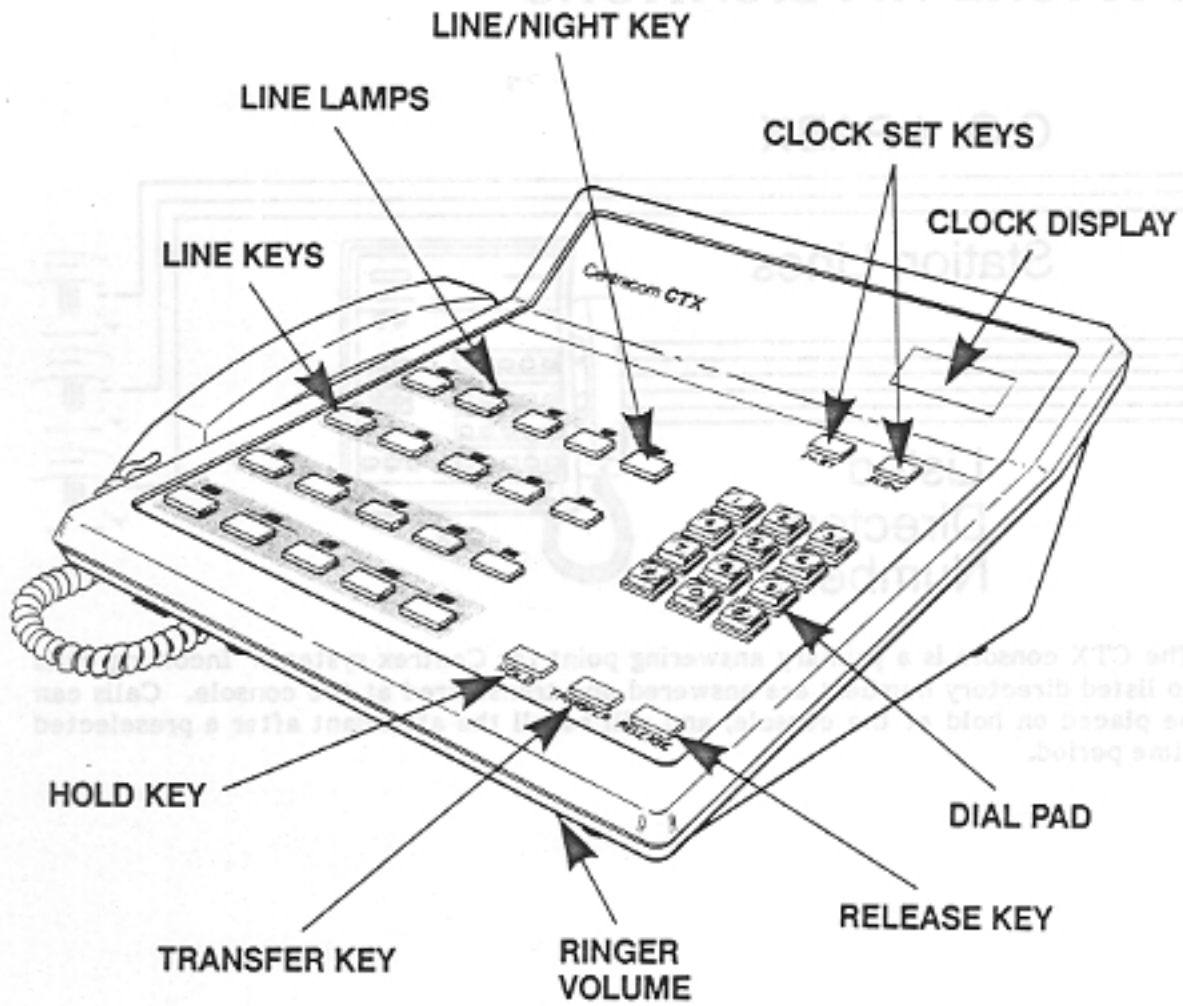
CONTENTS

PRODUCT DESCRIPTION

The Centracom CTX 5, CTX 10, and CTX 20 are 5, 10, and 20 line attendant consoles for use with Centrex-type service. The consoles have convenient hold and transfer features, and are equipped with a digital clock.

Indicator lamps show ringing, hold, hold recall, and busy at console states for each line. Option switches allow the installer to select timing values for hold recall, abandoned ring, and hold release.
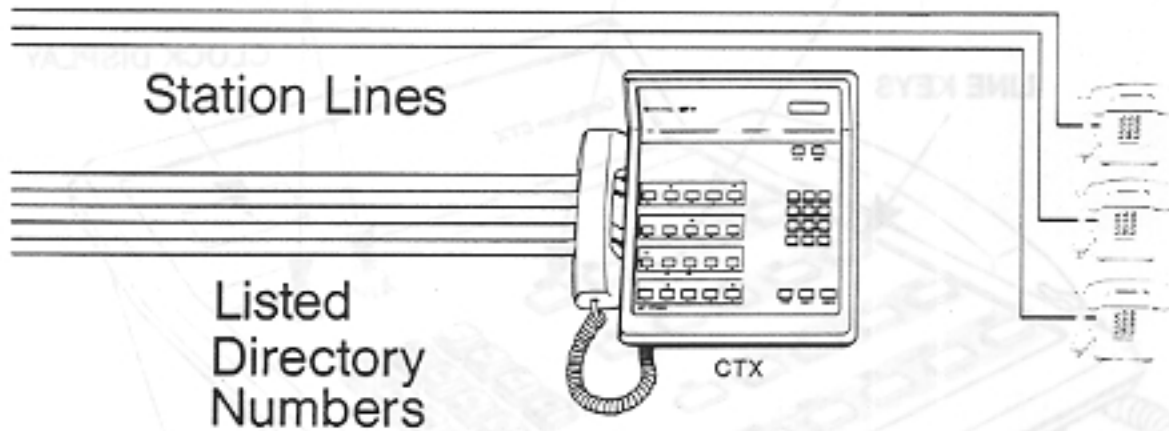
The CTX console is compatible with Tone Commander's Centracom CPC 600 DSS/Message Waiting console. Power for the CTX console may be supplied by the CPC 600's power supply, the local power transformer included with the CTX, or an external PABX or key system power supply.

- **Line Keys** - When a line key is pressed, the console network is connected to the selected line. The line lamp over the key lights steady to indicate the selected line. If a second line key is pressed, the first line is automatically put on hold and the second line is accessed.

- **Hold Key** - When the console is on an active line and the hold key is pressed, a hold bridge is placed across the selected line and the console network is released from the connection. The held line lamp will wink, indicating the hold condition.

- **Transfer Key** - When the transfer key is pressed, a hookflash (momentary open loop) is generated on the selected line.

- **Release Key** - When the console is on a line and the release key is pressed, the console network is released from the connection, the line becomes idle, and its lamp will turn off.

- **Dial Pad** - Generates dual tone signaling on a selected line.

- **Time Set Keys** - FAST key advances clock at fast rate for setting hours; SLOW key advances clock at slow rate for setting minutes.

- **Clock** - 12 hour (AM/PM) digital clock, synchronized from the 60Hz power line frequency.

- **Handset** - K-type, conventional carbon transmitter.

- **Handset Jack** - 4-position modular jack.

- **Headset Jack** - Compatible with conventional twin phone plug carbon microphone headsets. Handset transmitter is disconnected when headset is plugged in.

- **Power Jack** - Connector for wall plug in transformer.

- **Ringer Volume Control** - Slide pot to adjust ringer volume. Ringer turned off when control is at the left stop.

- **Night Key** - Line 20 may be optionally used to enable night bells or night transfer (CTX 20 model only).

LINE/NIGHT KEY

LINE LAMPS

CLOCK SET KEYS

CLOCK DISPLAY

LINE KEYS

HOLD KEY

DIAL PAD

RELEASE KEY

TRANSFER KEY

RINGER
VOLUME

POWER JACK

HEADSET JACKS

TYPICAL APPLICATIONS

C.O. / PABX

Station Lines

Listed
Directory
Numbers

The CTX console is a primary answering point for Centrex systems. Incoming calls to listed directory numbers are answered and transferred at the console. Calls can be placed on hold at the console, and will recall the attendant after a preselected time period.

C.O. / PABX

Station Lines

Listed
Directory
Numbers
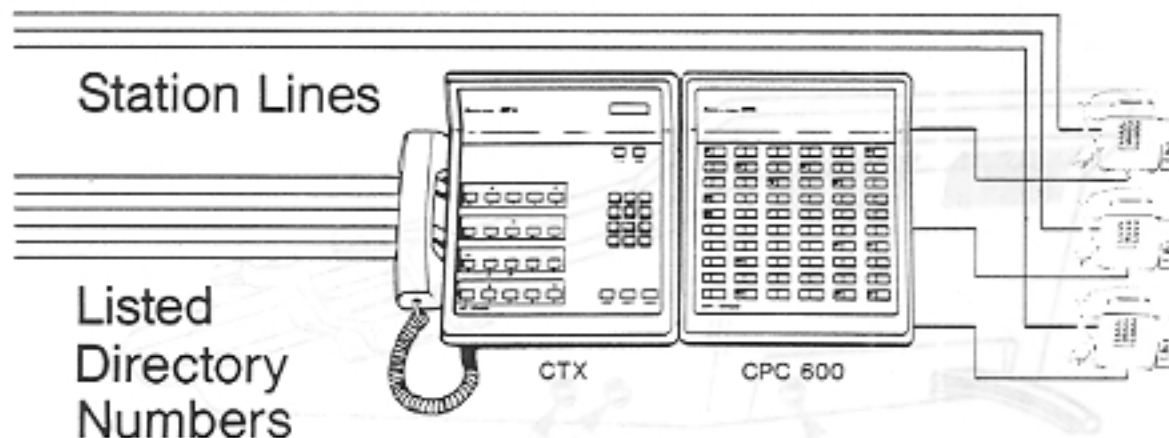
Larger systems may use the CPC 600 Call Processing Console for monitoring station status. In addition, the CPC 600 provides Direct Station Select (DSS), outside line and/or feature autodialing on spare keys, and message waiting lamp control.

SPECIFICATIONS

CO loop range:
    20-100 mA

CO Abandoned Ring:
    Selectable - - 2 to 8 seconds

CO Forced Disconnect (Hold Release):
    Selectable - - 20 milliseconds to 1 second

Automatic Hold Recall:
    Selectable - - 30 seconds to 10 minutes

Transfer Button Timed Hookflash:
    Selectable - - 600 milliseconds or 800 milliseconds

Night Bell Relay:
    Line 20 Key may be used for night bell or transfer (CTX 20 only). If either night feature is enabled, Line 20 Key toggles the feature ON and OFF.

Normal Line:	Line 20 Key used for a station line.
Night Bell:	Contact closure (dry pair) cycles with incoming ringing.
Night Transfer:	Constant contact closure.
Contact Rating:	1 A @ 25 VDC, 50 VA

Power Requirements

Input Power: 10 VAC, 60 Hz, 1.5 A

Fuse: AGC 2 Amp

Maximum loop length to console from power supply: 100 ft. over (6) 24 AWG wires

Physical

Dimensions, including handset cradle:
    5" (12.7 cm) H, 12" (30.5 cm) W, 11 3/8" (28.9 cm) D

Weight: 4.5 lb. (2 kg)

Environmental

Operating Temperature:
    32° to 104° F (0° to 40° C)

Storage Temperature:
    -4° to 140° F (-20° to 60° C)

Humidity:
    0 to 95%, noncondensing

SYSTEM OVERVIEW

C.O.
LINES
(DID STATIONS)

T
R
T
R
T
R

RJ21X

C.O.
LINES
(CONSOLE)

TL
RL
TN
RN

RJ21X

117 VAC

CTX

T-105

117 VAC

CPC 600
(optional)

INSTALLATION

Additional Material Required

(1) 66 M1-50 split block

(1) 25 pair cable from the block to the console, terminated with a female connector (100 ft. maximum if power supplied through cable)

(1) optional 10VAC power supply, 1.5A min.
     (Tone Commander T-105 or equivalent)

Mounting the Handset Cradle

Install the handset cradle on the console. The cradle may be installed on the right side, but this will prevent access to the headset jacks if another console is attached.
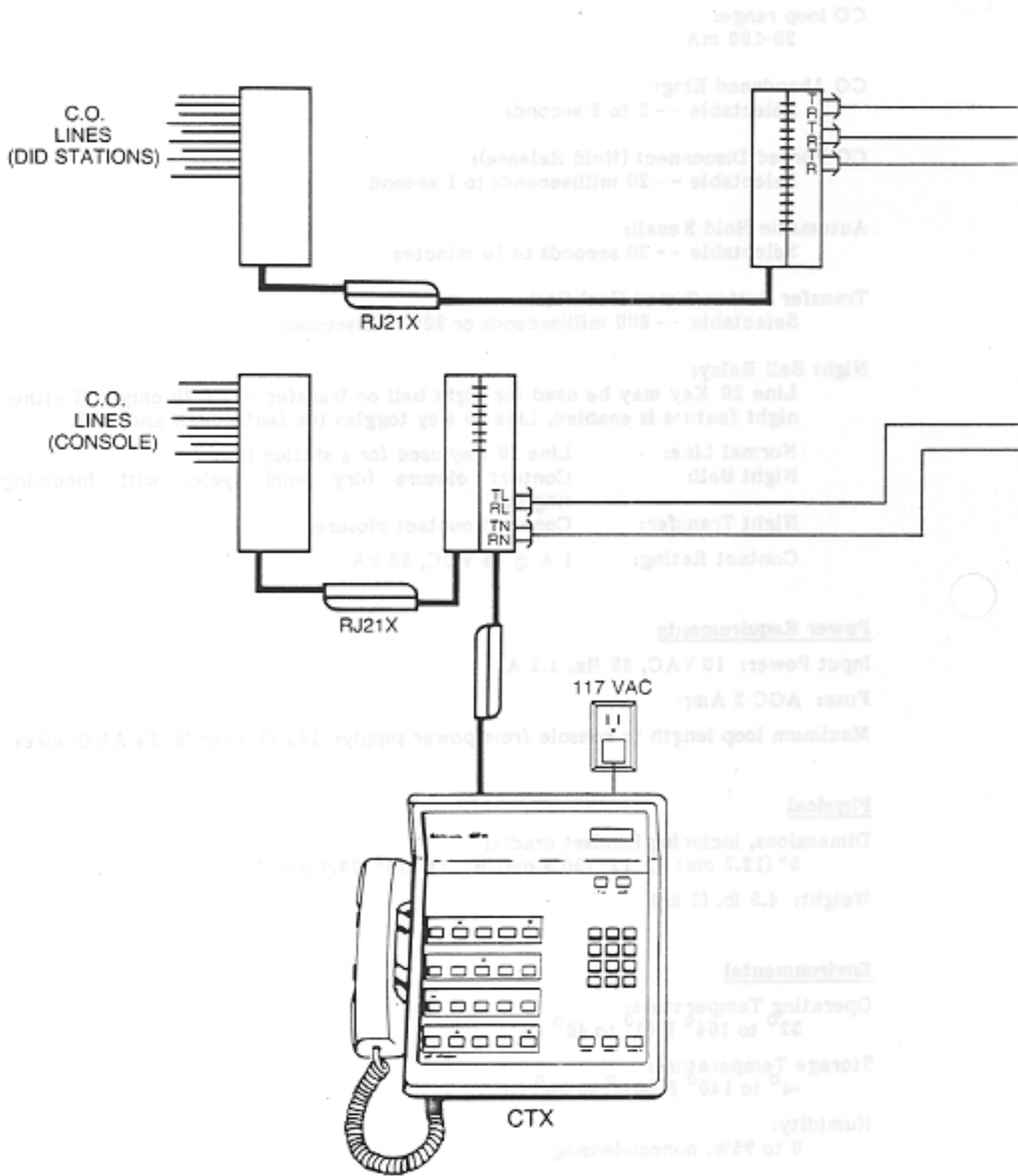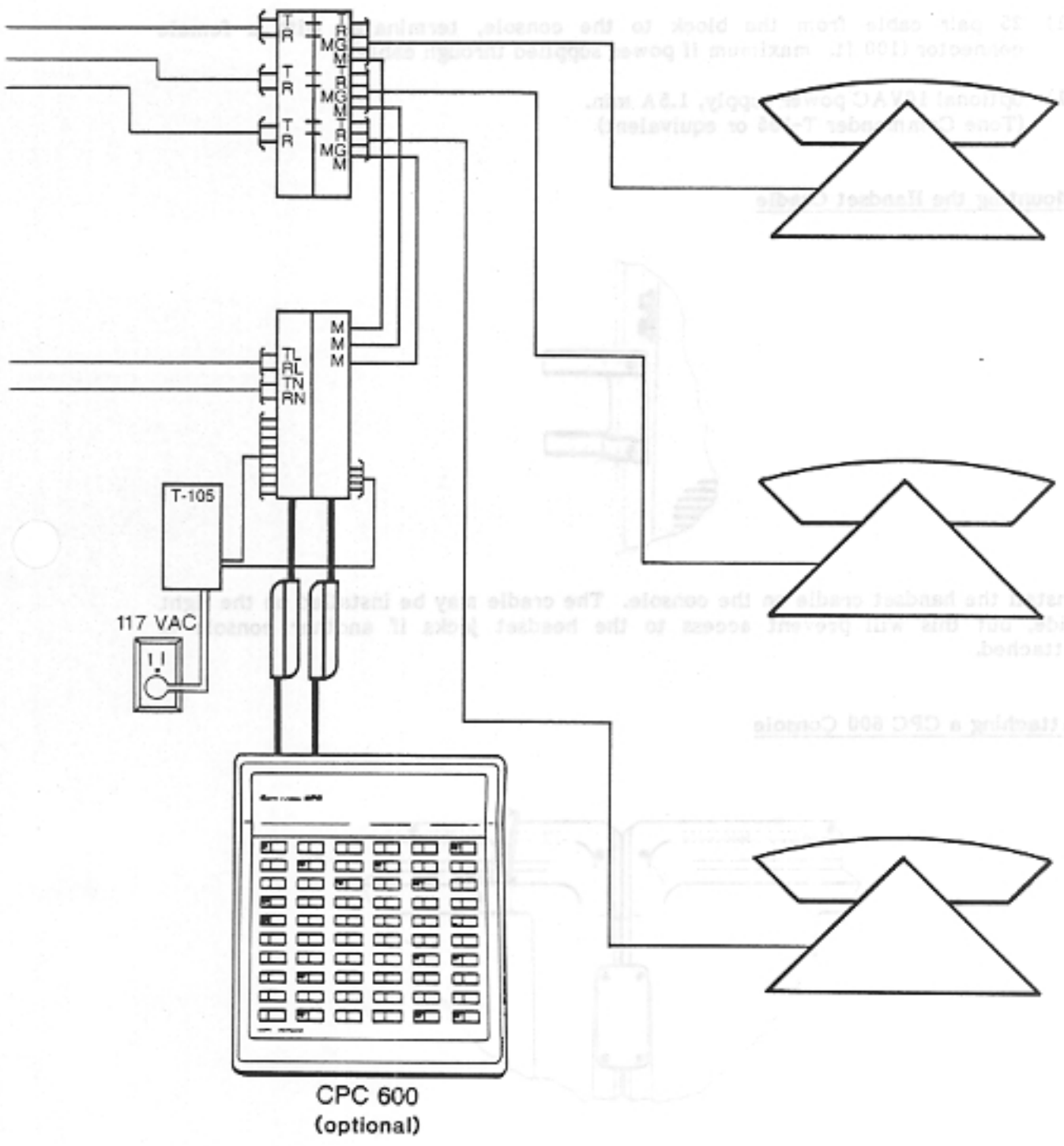
Attaching a CPC 600 Console
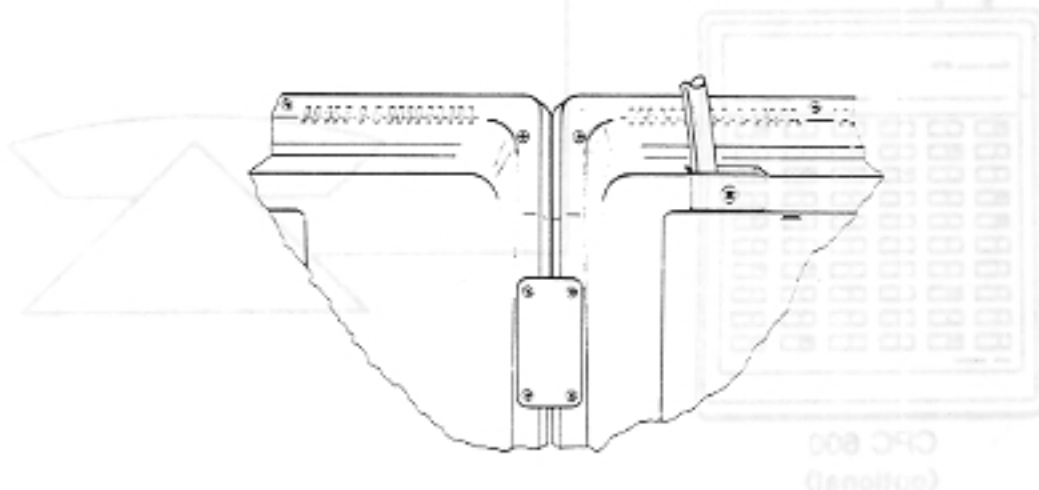
The CTX console may be attached to a CPC 600 console. Use the bracket and screws supplied with the CPC 600 to connect the consoles together.
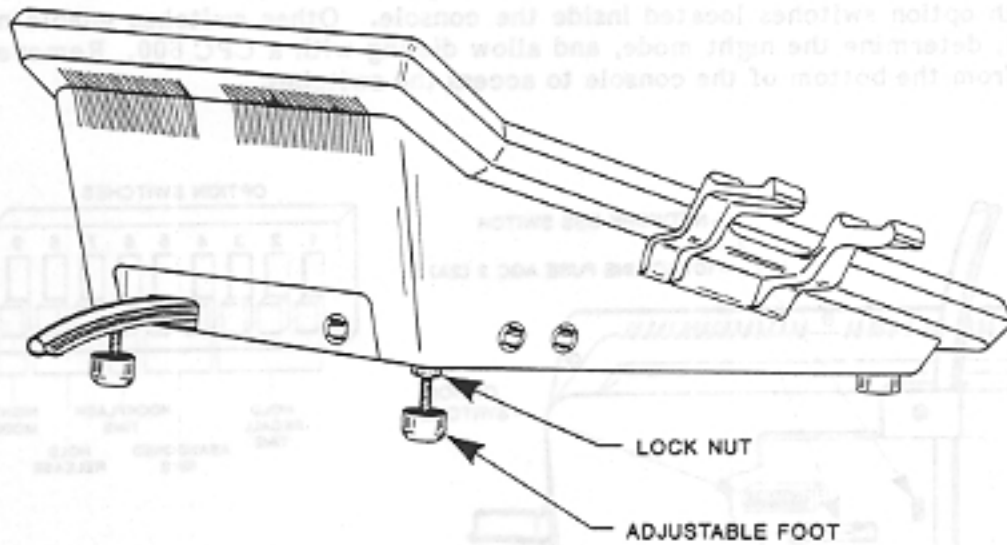
Adjusting the Console Angle

LOCK NUT

ADJUSTABLE FOOT

The rear feet may be adjusted to change the angle of the consoles. Remove the rear feet and install the black plastic nuts (shipped in the handset cradle bag) on the threaded 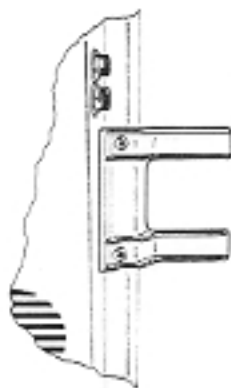studs. Screw the feet into the consoles until the desired angle is achieved, then tighten the nuts against the console housing.

Connecting the Handset

Centurion CTX

HANDSET JACK

Plug the provided handset cable into the handset and the jack beneath the front left edge of the console.

Setting Option Switches

Timing values for Hold Recall, Abandoned Ring, Hookflash, and Hold Release are set with option switches located inside the console. Other switches enable night service, determine the night mode, and allow dialing with a CPC 600. Remove the cover from the bottom of the console to access the switches.
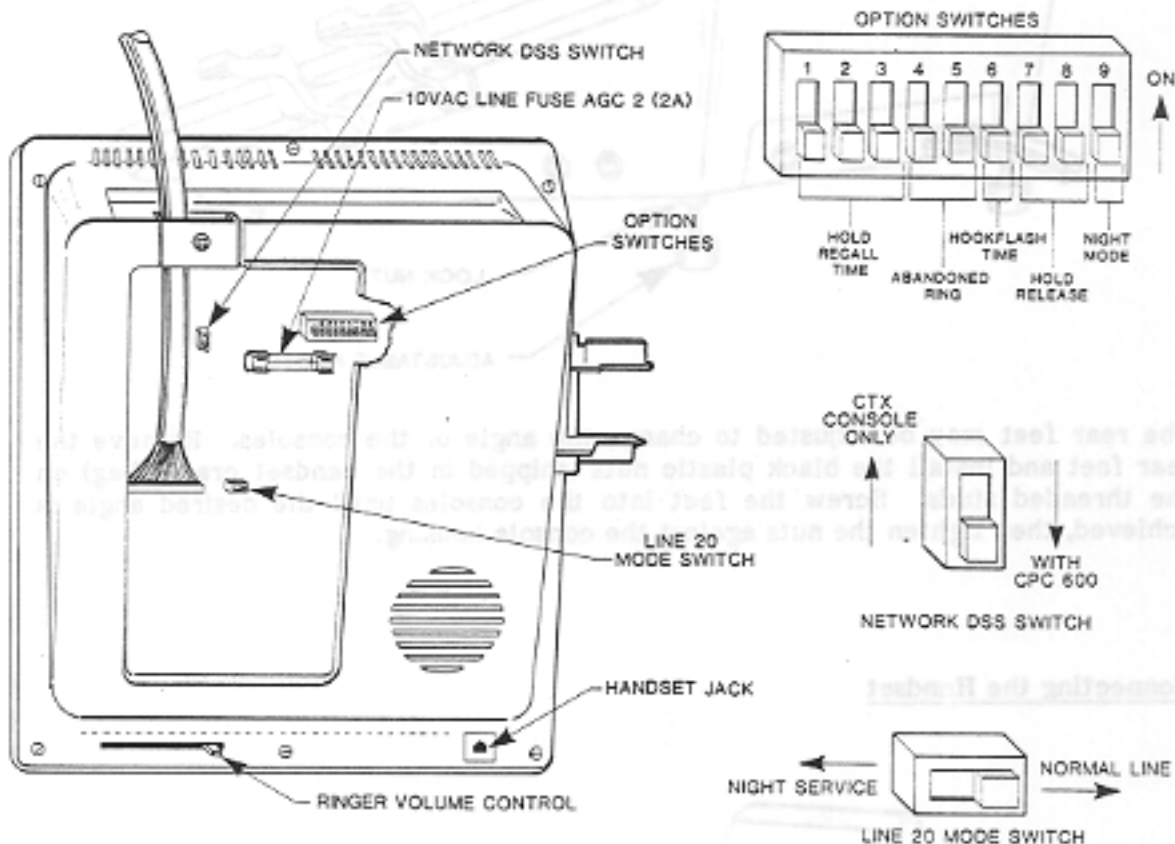
The Network DSS Switch

Set the Network DSS switch to 'CPC' when the console is used with a CPC 600. The CTX console will not work when in the DSS mode unless the CPC 600 is connected through TL, RL and TN, RN on the 25 pair connector. Set this switch to 'CTX' when a CPC 600 is not used with the system.

Line 20 Mode Switch

Line 20 key on the CTX 20 model may be used to enable night service, or as a normal line. The night feature is toggled on or off when the line key is pressed.

Select line 20 key's function with the Line 20 Mode Switch.

HOLD RECALL				ABANDONED RING			HOOKFLASH		HOLD RELEASE			NIGHT MODE	
SWITCHES			TIMING VALUE	SWITCHES		TIMING VALUE	SWITCH	TIMING VALUE	SWITCHES		TIMING VALUE	SWITCH	MODE
1	2	3		4	5		6		7	8		9	
off	off	off	30 sec	off	off	2 sec	off	**600 MSEC**	off	off	20 msec	off	**TRANSFER**
on	off	off	40 sec	on	off	**4 SEC**	on	800 msec	on	off	70 msec	on	bell
off	on	off	50 sec	off	on	6 sec			off	on	**600 MSEC**		
on	on	off	**60 SEC**	on	on	8 sec			on	on	1 sec		
off	off	on	90 sec										
on	off	on	2 min										
off	on	on	3 min										
on	on	on	10 min										

The switch setting combination on the left represents the timing value on the right.

BOLD values indicate factory default settings.

Night Mode Switch

When night service is selected with the Line 20 Mode Switch, line 20 key controls either night transfer or a night bell. Select the night mode with switch 9.

This switch has no effect if the Line 20 Mode Switch is set to 'Normal Line'.

Hold Recall Timing

The Hold Recall Timing determines the length of time before a call put on hold at the console will recall to the attendant.

Abandoned Ring Timing

The console measures the time between ringing bursts. When the quiet interval exceeds the Abandoned Ring Time it is assumed that the caller has hung up and ringing is turned off for that line. Set the Abandoned Ring timing slightly longer than the silent period between rings. If set too long, ringing continues after the caller has hung up. If set too short, the line lamps will stop flashing in the middle of a normal ringing cycle and an odd ringing pattern may occur. Four seconds provides an adequate setting for most systems.

Hookflash Timing

The Transfer key opens the line loop for a preselected time, simulating a hookflash. The timing value for most systems is 600 msec. If you have intermittent call transfer problems, use the 800 msec timing value.

Hold Release Timing

When a CO detects that a party has hung up, it signals to the other party with a momentary break in loop current. The time interval of the break varies depending on the Central Office. There can be momentary breaks of shorter time intervals for other reasons as well. The CTX console measures these breaks in order to disconnect when a call on hold hangs up. Consult the telephone company to determine length of the disconnect break time. Set the switches to the time interval that is just less than the disconnect signal of the CO.

Cabling and Connection Block

DESIGNATION	CONNECTOR PIN #	WIRE COLOR
T1	26	WHT-BLU
R1	1	BLU-WHT
T2	27	WHT-ORN
R2	2	ORN-WHT
T3	28	WHT-GRN
R3	3	GRN-WHT
T4	29	WHT-BRN
R4	4	BRN-WHT
T5	30	WHT-SLT
R5	5	SLT-WHT
T6	31	RED-BLU
R6	6	BLU-RED
T7	32	RED-ORN
R7	7	ORN-RED
T8	33	RED-GRN
R8	8	GRN-RED
T9	34	RED-BRN
R9	9	BRN-RED
T10	35	RED-SLT
R10	10	SLT-RED
T11	36	BLK-BLU
R11	11	BLU-BLK
T12	37	BLK-ORN
R12	12	ORN-BLK
T13	38	BLK-GRN
R13	13	GRN-BLK
T14	39	BLK-BRN
R14	14	BRN-BLK
T15	40	BLK-SLT
R15	15	SLT-BLK
T16	41	YEL-BLU
R16	16	BLU-YEL
T17	42	YEL-ORN
R17	17	ORN-YEL
T18	43	YEL-GRN
R18	18	GRN-YEL
T19	44	YEL-BRN
R19	19	BRN-YEL
T20	45	YEL-SLT
R20	20	SLT-YEL
TL	46	VIO-BLU
RL	21	BLU-VIO
TN	47	VIO-ORN
RN	22	ORN-VIO
COM	48	VIO-GRN
10V	23	GRN-VIO
COM	49	VIO-BRN
10V	24	BRN-VIO
COM	50	VIO-SLT
10V	25	SLT-VIO

Used with DSS console (CPC 600). { TL, RL, TN, RN }

Used only if power provided through cable. { COM, 10V, COM, 10V, COM, 10V }

Run a 25 pair cable from the console location to the telephone equipment room. The cable must have a female connector at the console end; plug the console into this connector.

In the equipment room, punch down the cable to the right side of a 66M1-50 split block (or use a connectorized block). Label the block as shown in the 'designation' column of the table above.

Cross Connections to the Central Office or PABX
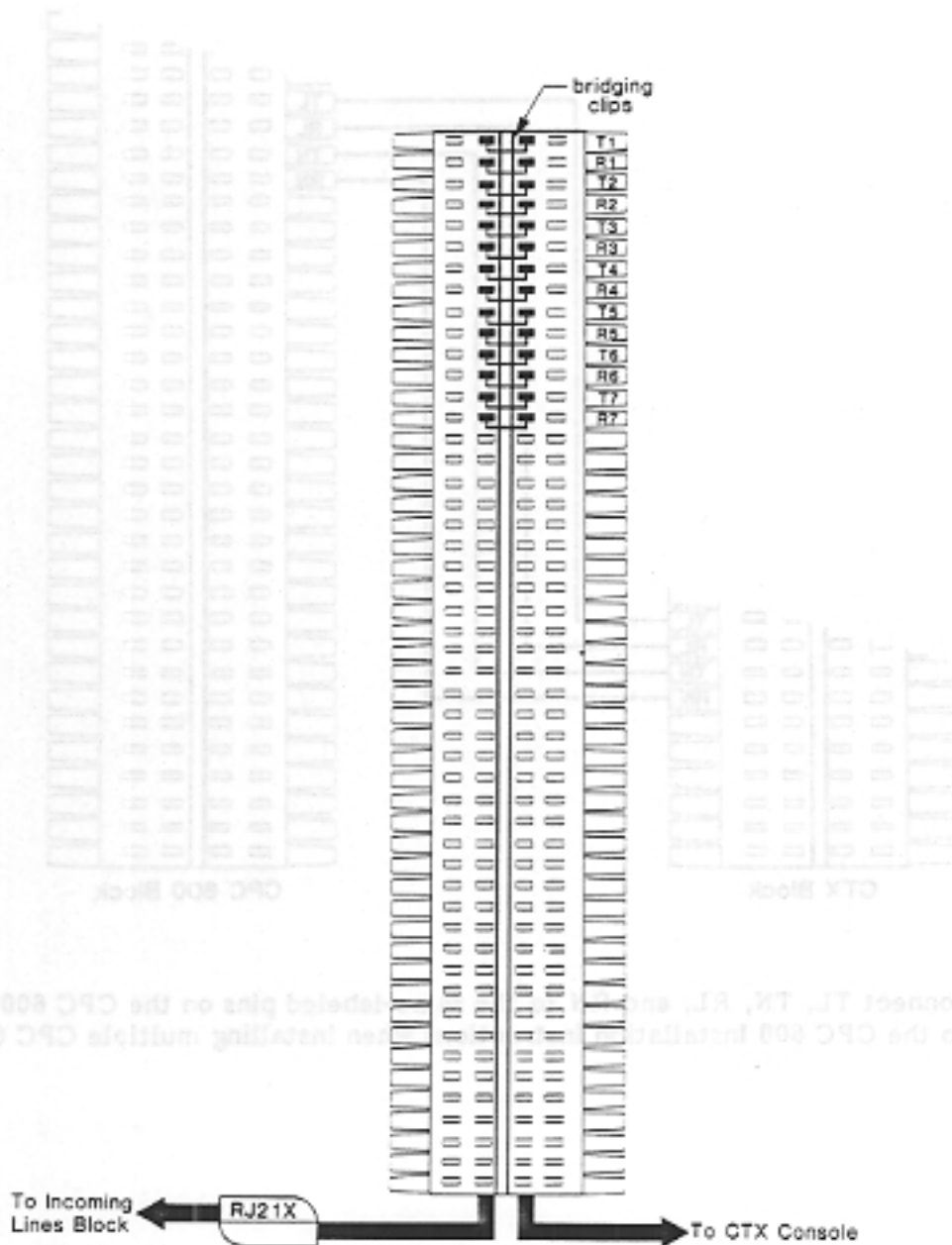
Punch down a 25 pair cable with a female connector to the left side of the CTX block. This cable plugs into the RJ21x connector provided by the telephone company for incoming lines. Use bridging clips to connect active lines to the CTX cable.

Incoming lines may be cross connected directly to the CTX block in a PABX installation.

Cross Connections to the CPC 600 Console

CTX Block   CPC 600 Block
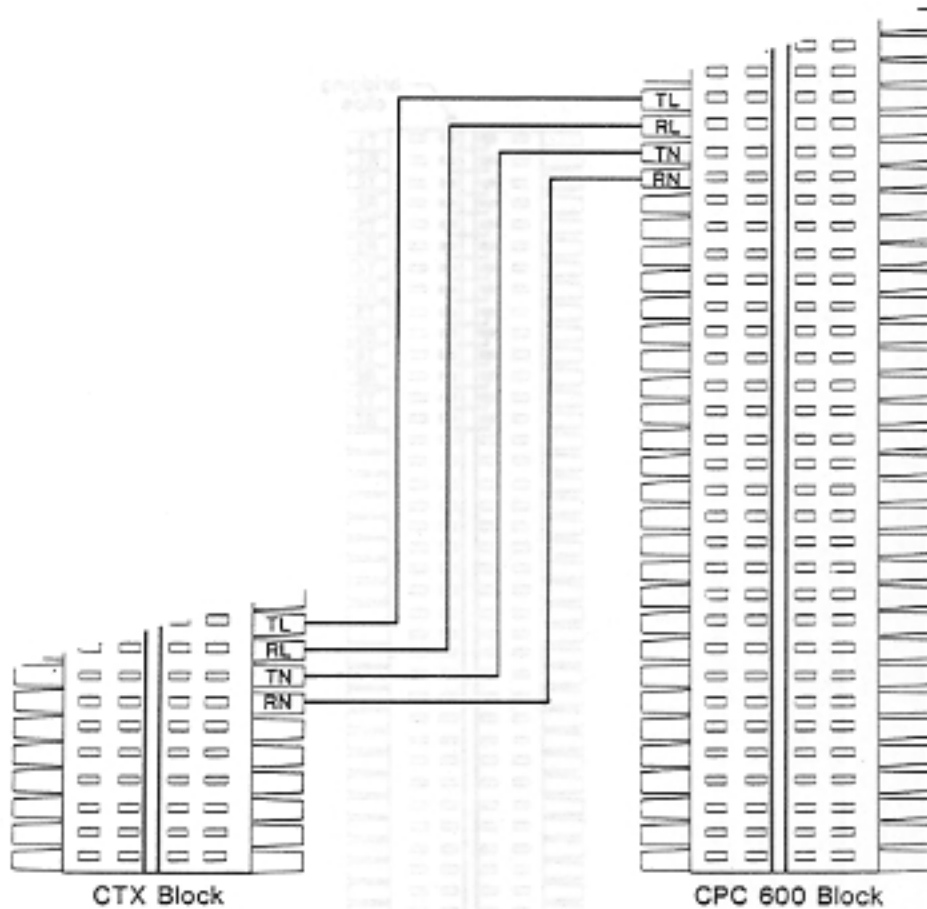
Cross connect TL, TN, RL, and RN to the same-labeled pins on the CPC 600 block.
Refer to the CPC 600 Installation Instructions when installing multiple CPC 600s.

Paging

Paging can be accessed from a spare line key. If a local paging system such as the
Tone Commander PCU 8 is used, it must provide talk battery to the console. Cross
connect the paging system input to T and R of the spare line key.

Night Service

Line 20 key on the CTX 20 model may be used to enable a night bell, or to switch the telephone system into night transfer mode. The night feature is toggled on or off when the line key is pressed.

Option switches must be set to enable night bells or night transfer.
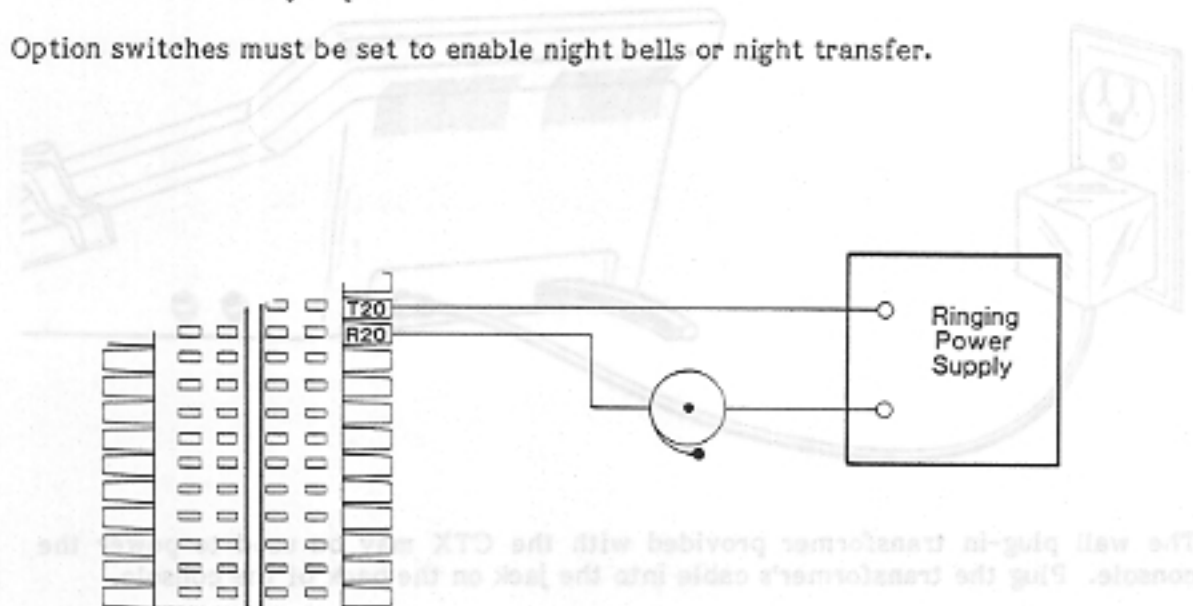
Night bell: T20 and R20 are connected to a dry relay contact in the console which closes during incoming ring of any line terminated on the console. A night bell, connected to an external power supply, is switched on by this contact.
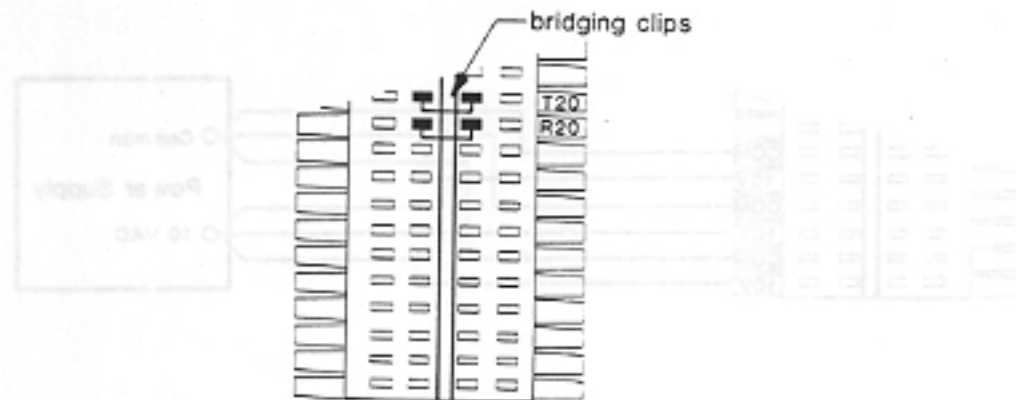
Night transfer: T20 and R20 are connected to a dry relay contact in the console which remains closed until the line 20 key is pressed again. These pins connect to the night transfer leads from the C.O. The night transfer leads must appear on the YEL-SLT/SLT-YEL pair of the incoming lines cable.

Power

The wall plug-in transformer provided with the CTX may be used to power the console. Plug the transformer's cable into the jack on the back of the console.
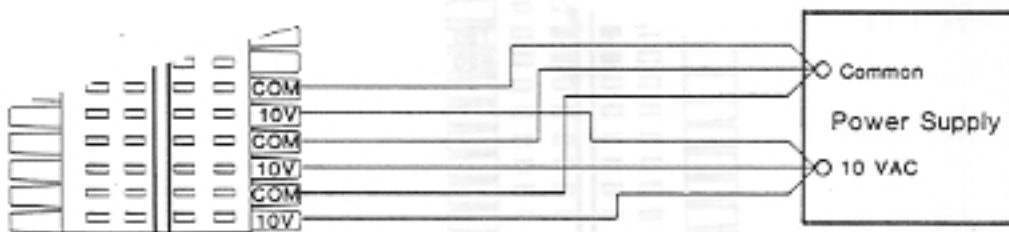
Another option is to provide power through the 25 pair cable (100 ft. maximum cable length). The power source may be the power output of an LM 600 or MWI 600, or a separate power supply (Tone Commander T-105 or equivalent). Connect each of the three power pairs individually to the supply to ensure sufficient power to the console.

USING THE CTX CONSOLE

IMPORTANT:

To avoid losing calls, wait for supervisory tones (dial tone, busy tone, or ringing) before dialing or pressing TRANSFER or RELEASE. Any delay in receiving these tones is caused by the telephone system, not the CTX console.

<u>To answer an incoming call:</u>

- When the phone rings, the red lamp for the incoming call line will flash.

- To answer the call, press the key for the ringing line.

(line)

<u>To place a call:</u>

- Press an idle line key.

- Wait for dial tone.

- Dial the number with the dial pad.

(line)

<u>To end a call:</u>

- Press the RELEASE key. The line the handset or headset was connected to will 'hang up'.

RELEASE

To place a call on hold:

- Press the HOLD key.

- or -

- Press another line key, to answer or place a call. The first call is automatically placed on hold.

HOLD

As a reminder to the attendant, calls on hold longer than the programmed 'hold recall time' will begin ringing. These calls can be differentiated from an incoming call by the ringing pattern and lamp flashing rate.

To reconnect to a call on hold:

- Press the line key for the held line.

(line)

To transfer a call (unscreened):

- Press the TRANSFER key.

- Wait for dial tone.

- Dial the station where the call will be transferred to.

- If the station rings, press the RELEASE key.

- If the station is busy, press the TRANSFER key twice to reconnect to the caller.
  (One some telephone systems, press the TRANSFER key once.)

TRANSFER   RELEASE

or

TRANSFER   TRANSFER

To transfer a call (screened):

- Press the TRANSFER key.

- Wait for dial tone.

- Dial the station where the call will be transferred to.

- Wait for the called party to answer, and ask them if they will accept the transferred call.

- If yes, press the RELEASE key.

- If no, wait for the called party to hang up; you will then be reconnected to the caller.
(On some telephone systems, press the TRANSFER key once or twice to reconnect.)
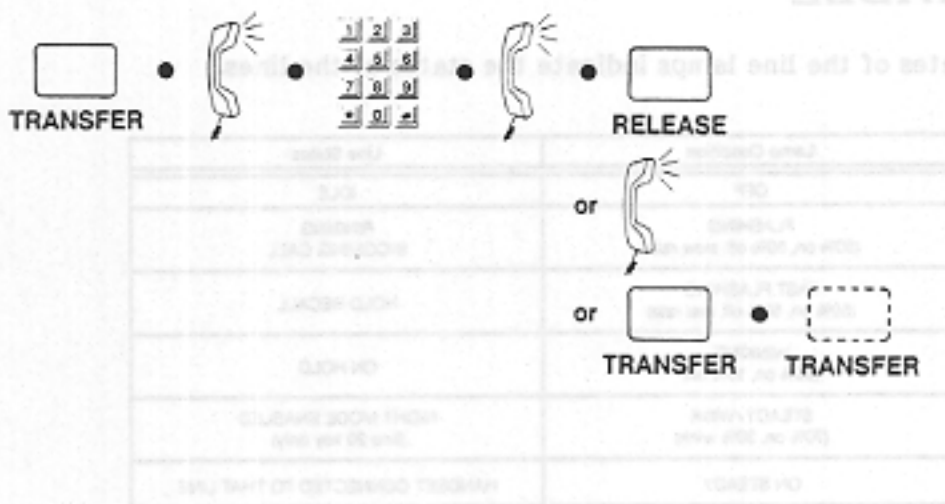
To activate night transfer or night bells, if installed in your system:

- Press Line 20 key.

Night Bells: Incoming calls will ring over the night bell system, if installed, in addition to ringing at the console.

Night Transfer: Incoming calls will ring at the night transfer stations, as programmed by the telephone company.

- Press Line 20 key again to resume normal daytime operation.

(line 20)

<u>To set the clock:</u>

- Press the FAST key to rapidly cycle the clock display forward.

- Press the SLOW key to slowly approach the correct time.

<u>To use a headset:</u>

- Plug the headset into the headset jacks.
  This disconnects the handset's transmitter.

- The handset may still be used for listening.

LAMP TABLE

The on/off rates of the line lamps indicate the status of the lines.

Lamp Condition	Line Status
OFF	IDLE
FLASHING (50% on, 50% off, slow rate)	RINGING INCOMING CALL
FAST FLASHING (50% on, 50% off, fast rate)	HOLD RECALL
WINKING (90% on, 10% off)	ON HOLD
STEADY/WINK (70% on, 30% wink)	NIGHT MODE ENABLED (line 20 key only)
ON STEADY	HANDSET CONNECTED TO THAT LINE

RINGING TABLE

The console ringing pattern varies with the line status.

When a line is accessed and another line rings, the ringing tone is abbreviated. This feature allows attendants to process calls with less background ringing at the console.

Ringing State	Line Status
RINGING (1 ring burst every 4 seconds)	INCOMING CALL ON ANY LINE
RECALL (2 ring bursts every 4 seconds)	HOLD RECALL TIME-OUT ON ANY LINE
BEEP	ACTIVE LINE RELEASED (with Release key)

TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE
1 No dial tone on any line (not equipped with CPC 600).	Network DSS option switch is in the wrong position.
2 No dial tone on any line (equipped with CPC 600).	Open jumper wire on TL, RL, TN, RN pins.
3 Auto dialing side tone excessively loud from CPC 600.	Network DSS option switch is in the wrong position.
4 Erratic ring pattern and lamp indication on incoming call.	Abandoned Ring switches not set properly.
5 Calls placed on hold disconnect.	Hold Release switches not set properly.
6 Transferred calls disconnecting.	Receptionist not waiting for second dial tone from C.O. before dialing station code.
7 Hum on all lines (equipped with CPC 600).	CPC 600 J5 BLK-ORN, BLK-BRN (TIP N, GRD) reversed. See doc. #13-101579.

SERVICE

Maintenance and repair on the Centracom CTX Console must be done by Tone Commander. If the unit is defective, please contact:

TONE COMMANDER.

CUSTOMER SERVICE ENGINEERING DEPARTMENT
Box 97039 • 4320 150th Avenue NE
Redmond, WA 98073-9739 USA
Phone: (206) 883-3600   Telex: 15-2246

RELATED DOCUMENTATION

#14-280137, Centracom CTX User's Guide
#14-280138, Centracom CPC User's Guide
#13-101579, Centracom CPC 600 Installation Instructions
#13-101881, SSM Installation Instructions
#14-280135, SSM User Instructions
#13-101944, LM 600/MWI 600 Installation Instructions

WARRANTY

For a period of one year from date of manufacture, Tone Commander Systems, Inc. (Tone Commander) warrants its products to be free from defects in material and workmanship under conditions of normal use and service. Tone Commander shall, at its option, repair or replace any defective product which in its opinion has not been misused, damaged, or improperly installed.

Repair or replacement under this warranty will be performed at Tone Commander's factory. Authorization for return (with freight prepaid) must be obtained from Tone Commander prior to returning a product.

Products beyond the warranty period may be repaired at the factory for a reasonable charge. Repaired out-of-warranty units are warranted as above for 90 days from the date of repair.

A handling charge will be assessed on all units, in or out of warranty, that are returned and found to be free of defects.

The repair or replacement of a product under this warranty represents the entire obligation of Tone Commander; and Tone Commander shall not be liable for any special or consequential damages resulting from or caused by any defect, failure, incapacity or malfunction of any of its products.

The foregoing express warranty is in lieu of all other warranties, express or implied, including but not limited to, any implied warranty of merchantability, fitness or adequacy for any purpose or use, quality, productiveness or capacity; and Tone Commander, to the extent permitted by law, hereby disclaims all such other warranties.

For a period of one year from date of manufacture, Tone Commander Systems, Inc. (Tone Commander) warrants its products to be free from defects in material and workmanship under conditions of normal use and service. Tone Commander shall, at its option, repair or replace any defective product which in its opinion has not been misused, damaged, or improperly installed.

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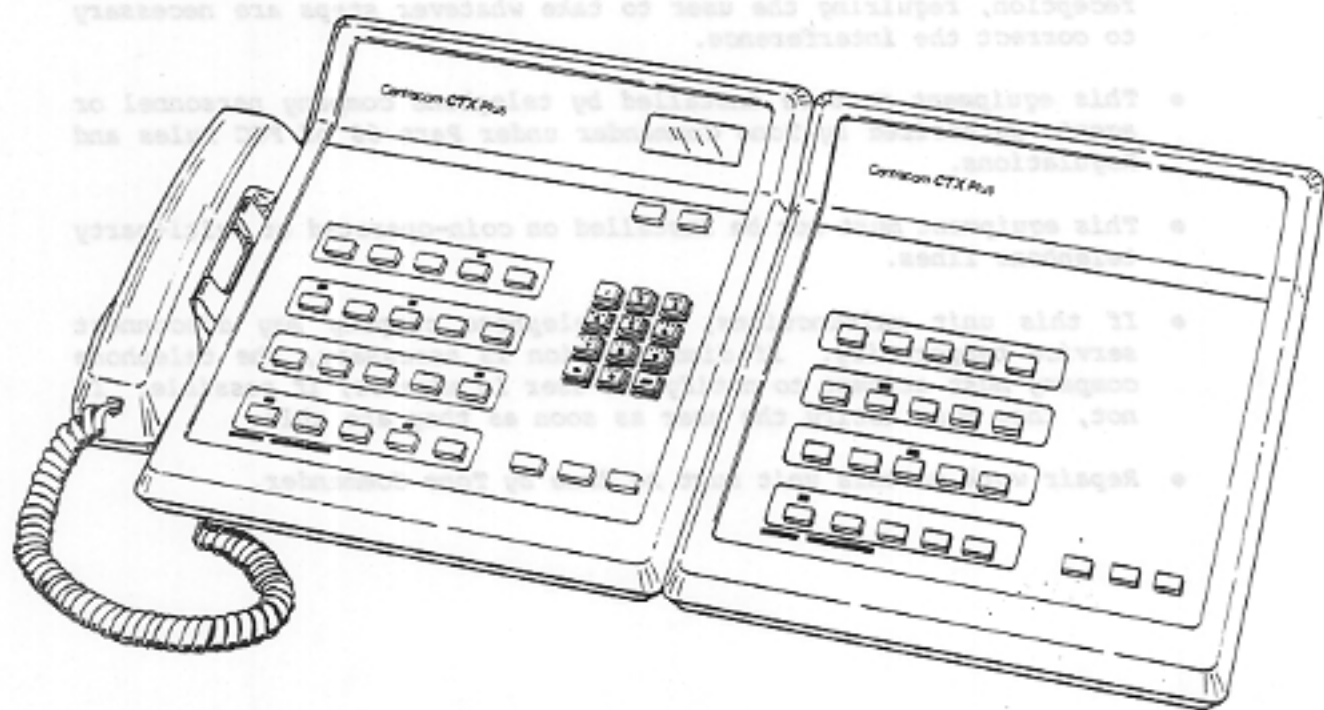
The repair or replacement of a product under this warranty represents the entire obligation of Tone Commander, and Tone Commander shall not be liable for any special or consequential damages resulting from or caused by any defect, failure, incapacity or malfunction of any of its products

The foregoing express warranty is in lieu of all other warranties, express or implied, including but not limited to, any implied warranty of merchantability, fitness or adequacy for any purpose or use, quality, productiveness or capacity and Tone Commander, to the extent permitted by law, hereby disclaims all such other warranties.

TONE COMMANDER.

CENTRACOM® CTX PLUS
CTX PLUS EXPANSION
INSTALLATION
INSTRUCTIONS

FCC REQUIREMENTS

To comply with Federal Communications Commission (FCC) regulations, the following requirements must be met:

- *The FCC registration number of this unit (AHI9V9-15422-MT-T) and the Ringer Equivalance (0.5A), if requested by the telephone company, must be reported.*

- *The total of all ringer equivalence numbers on any one line should not exceed 5.0 for best performance.*

- *This equipment complies with the requirements in Part 15 of FCC Rules for a "Class A" computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception, requiring the user to take whatever steps are necessary to correct the interference.*

- *This equipment must be installed by telephone company personnel or agents authorized by Tone Commander under Part 68 of FCC Rules and Regulations.*

- *This equipment must not be installed on coin-operated or multi-party telephone lines.*

- *If this unit malfunctions, the telephone company may disconnect service temporarily. If disconnection is necessary, the telephone company must attempt to notify the user in advance, if possible. If not, they must notify the user as soon as they are able.*

- *Repair work on this unit must be done by Tone Commander.*

Manual Changes

This revision is issued to add configuration sheets.

CONTENTS

PRODUCT DESCRIPTION

The Centracom CTX Plus-10 and CTX Plus-20 are telephone answering consoles with station monitoring for use with Centrex-type services or PABX's. The console connects in parallel with up to 10 (CTX Plus-10) or 20 (CTX Plus-20) lines, providing an answering position for these lines. Calls may be put on hold or transferred from the console. Listed directory numbers or group access numbers may also appear on the console keys. Two or more Centracom CTX Plus consoles may be paralleled on the same lines to provide tandem or backup answering points.

Indicator lamps show ringing, hold, hold recall, and busy states for each line. Hold and hold recall indications show only on the console that initiated hold. Parallel consoles will display busy status only. A 12-hour (AM/PM) clock is included on the console's front panel. The CTX Plus-20 model has a relay for activating an optional night bell.

The console is programmable for various central office or PABX timing parameters. The attendant may select the number of incoming rings at a station before the console begins to ring. Station lines may be programmed for privacy if desired (exclude console line access when busy).

Systems with large line requirements may add CTX Plus Expansion Consoles to the main console. These units do not have a handset, dial pad, or clock, but are otherwise identical to the CTX Plus-20.
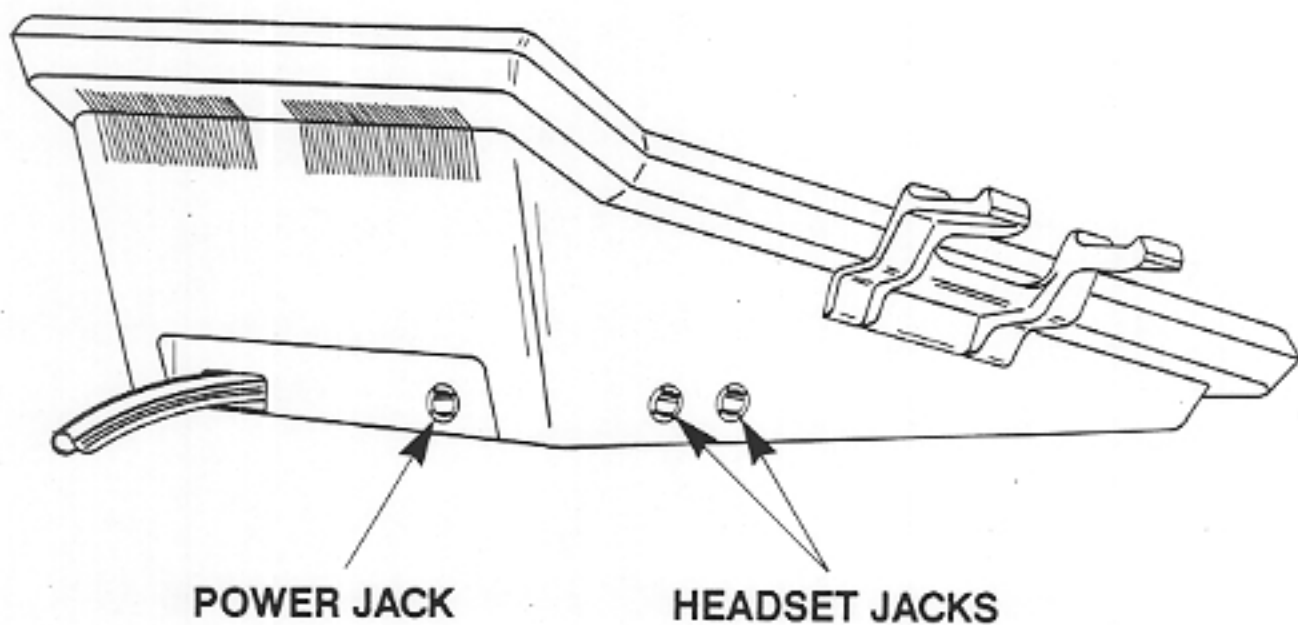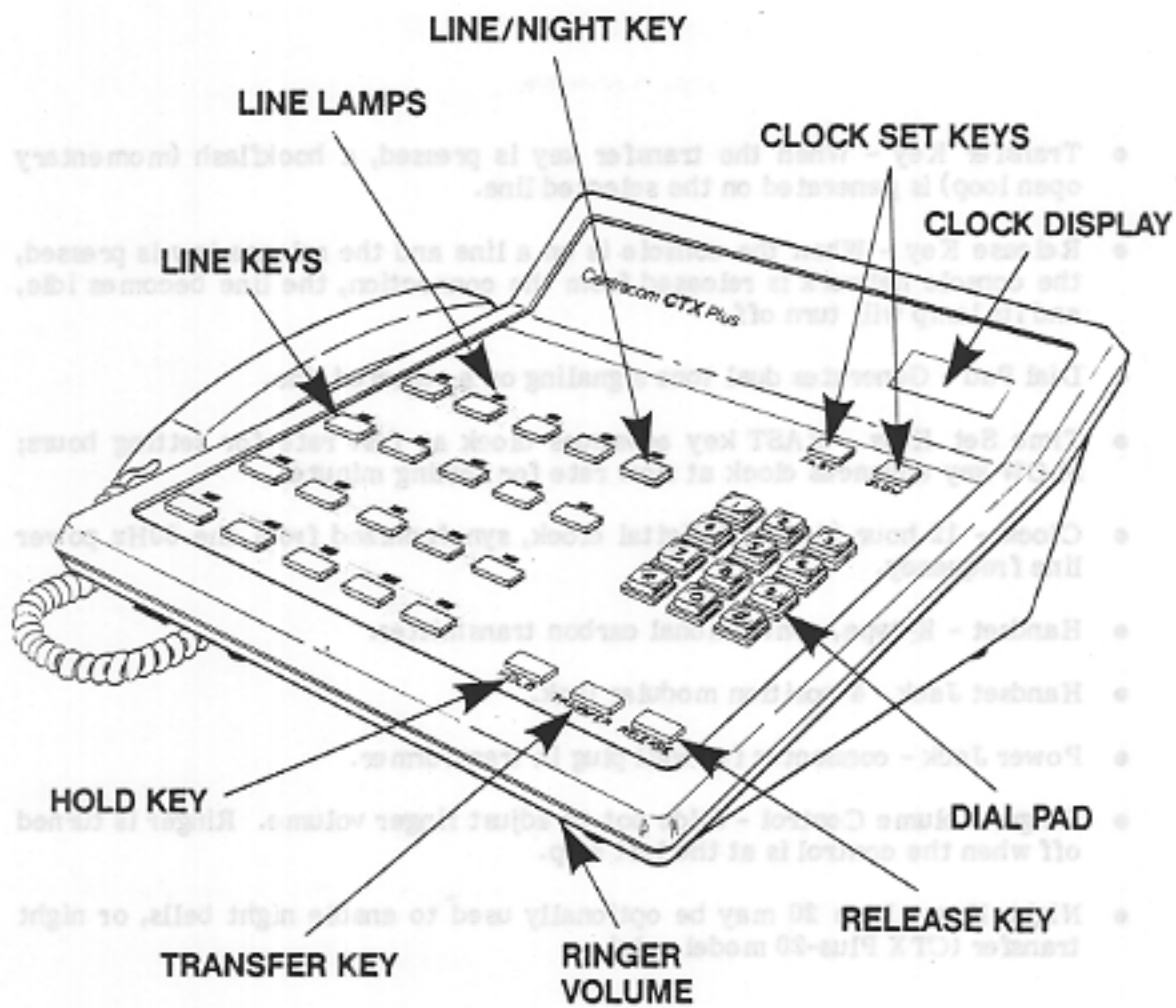
The CTX Plus is compatible with Tone Commander's Centracom CPC 600 and CPC 1000 Call Processing Consoles. Power for the CTX Plus may be supplied by the CPC's power supply, the local power transformer included with the CTX Plus, or an external PABX or key system power supply.

- Line Keys - When a line key is pressed, the console network is connected to the selected line. If a second line key is pressed, the first line is automatically put on hold and the second line is accessed.

- Line Lamp - Lamps above each line key indicate the state of the lines.

- Hold Key - When the console is on an active line and the hold key is pressed, a hold bridge is placed across the selected line and the console network is released from the connection. The held line lamp will wink, indicating the hold condition.

LINE/NIGHT KEY

LINE LAMPS

CLOCK SET KEYS

CLOCK DISPLAY

LINE KEYS

Cameracom CTX Plus

HOLD KEY

DIAL PAD

TRANSFER KEY

RELEASE KEY

RINGER
VOLUME

POWER JACK

HEADSET JACKS

- Transfer Key - When the transfer key is pressed, a hookflash (momentary open loop) is generated on the selected line.

- Release Key - When the console is on a line and the release key is pressed, the console network is released from the connection, the line becomes idle, and its lamp will turn off.

- Dial Pad - Generates dual tone signaling on a selected line.

- Time Set Keys - FAST key advances clock at fast rate for setting hours; SLOW key advances clock at slow rate for setting minutes.

- Clock - 12 hour (AM/PM) digital clock, synchronized from the 60Hz power line frequency.

- Handset - K-type, conventional carbon transmitter.

- Handset Jack - 4-position modular jack.

- Power Jack - connector for wall plug in transformer.

- Ringer Volume Control - Slide pot to adjust ringer volume. Ringer is turned off when the control is at the left stop.

- Night Key - Line 20 may be optionally used to enable night bells, or night transfer (CTX Plus-20 model only).
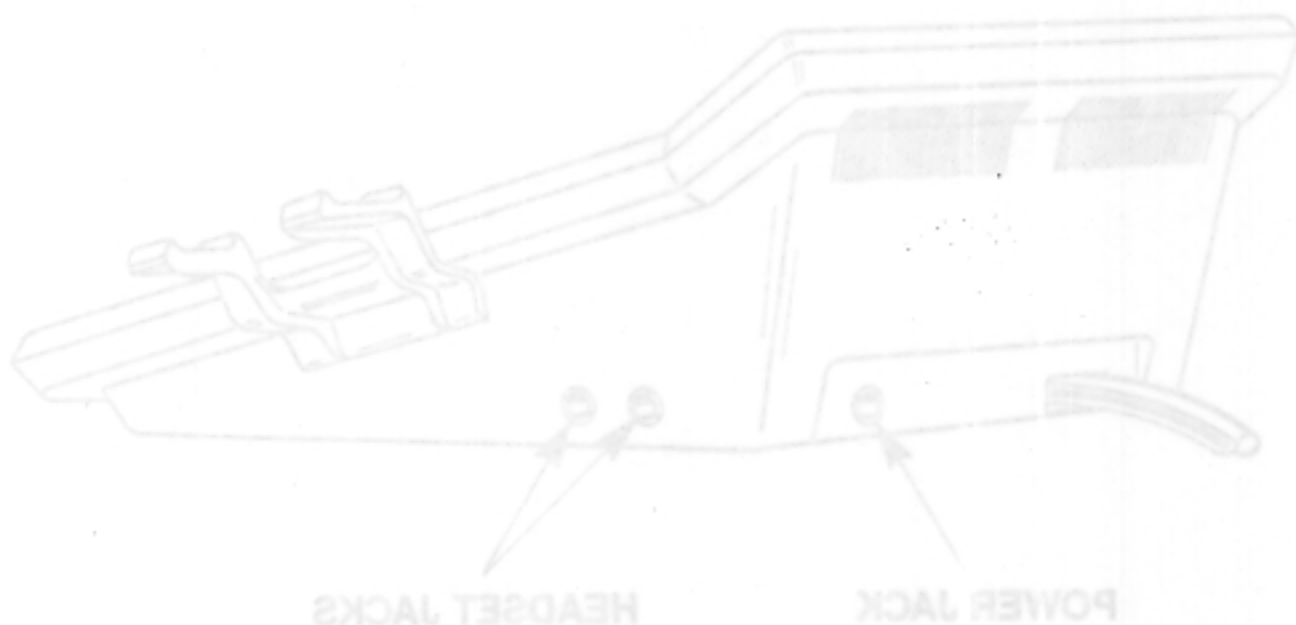
SPECIFICATIONS

CO loop range:
    20-100 mA

CO Abandoned Ring:
    Selectable - - 2 to 20 seconds

Station Line Connections:
    6' cable with A25B connector

CO Forced Disconnect (Hold Release):
    Selectable - - 20 milliseconds to 2 seconds

Automatic Hold Recall:
    Selectable - - 30 seconds to 3 minutes, or no recall

Ringing Delay:
    Selectable - - 0 to 6 rings, or no console ringing

Line Privacy:
    Selectable per line

Night Bell Relay:
    Line 20 Key may be used for night bell or transfer (CTX Plus-20 only). If either night feature is enabled, Line 20 Key toggles the feature ON and OFF.

Normal Line:	Line 20 Key used for a station line.
Night Bell:	Contact closure (dry pair) cycles with incoming ringing.
Night Transfer:	Constant contact closure.
Contact Rating:	1 A @ 25 VDC, 50 VA

Power Requirements

Input Power: 10 VAC, 60 Hz, 1.5 A

Fuse: AGC 2 Amp

Maximum loop length to console from power supply:
    100 ft. over 24 AWG wires

Physical

Dimensions, including handset cradle:
    5" (12.7 cm) H, 12" (30.5 cm) W, 11 3/8" (28.9 cm) D

Weight: 4.5 lb. (2 kg)

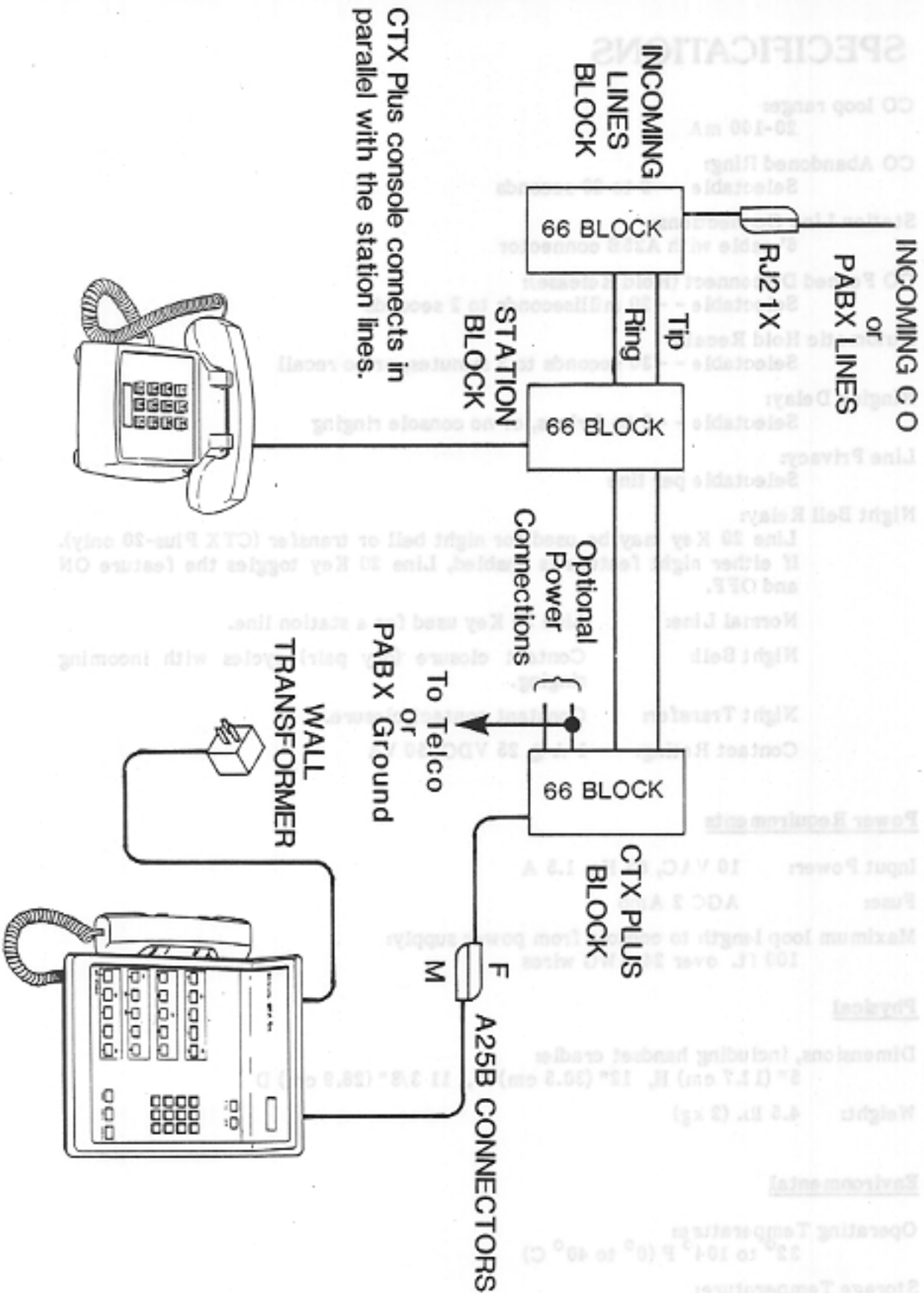## Environmental

Operating Temperature:
    32° to 104° F (0° to 40° C)

Storage Temperature:
    -4° to 140° F (-20° to 60° C)

Humidity:
    0 to 95%, noncondensing

SYSTEM OVERVIEW

INCOMING C O
or
PABX LINES

RJ21x

INCOMING LINES BLOCK

66 BLOCK

Ring

Tip

STATION BLOCK

66 BLOCK

CTX Plus console connects in parallel with the station lines.

Optional Power Connections

To Telco
or
PABX Ground

66 BLOCK

CTX PLUS BLOCK

WALL TRANSFORMER

M

F

A25B CONNECTORS

INSTALLATION

Additional Material Required

(1) 66M1-50 split block
(1) 25 pair cable from the block to the console, terminated with a female connector (100 ft. maximum if power supplied through cable)
(10) optional 10 VAC power suply, 1.5A min.
Tone Commander T-105A or equivalent)
(1) fine point permanent marking pen to label blocks
mounting hardware for blocks
cross connect wire

Mounting the Handset Cradle
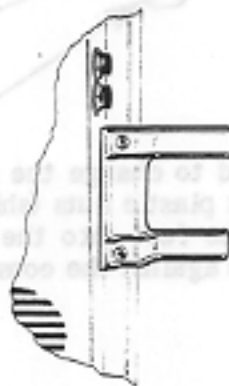
Install the handset cradle on the console. The cradle may be installed on the right side, but this will prevent access to the headset jacks if another console is attached.

Attaching Another Console
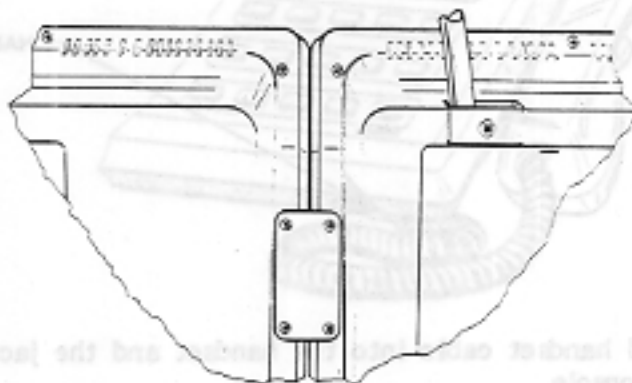
The CTX Plus console may be attached to a CTX Plus Expansion Console or a CPC Call Processing Console. Use the bracket and screws supplied with the expansion console or the CPC to connect the consoles together.
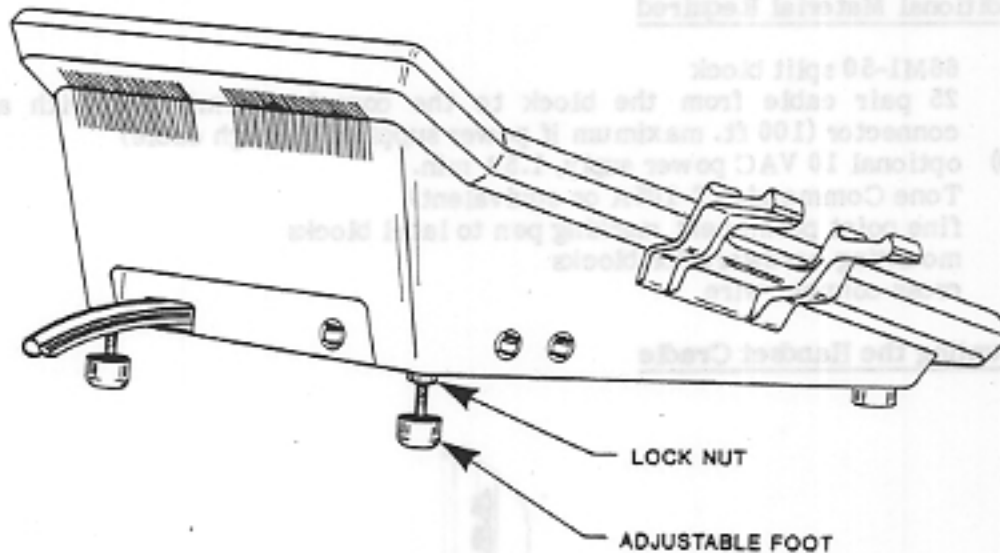
Adjusting the Console Angle
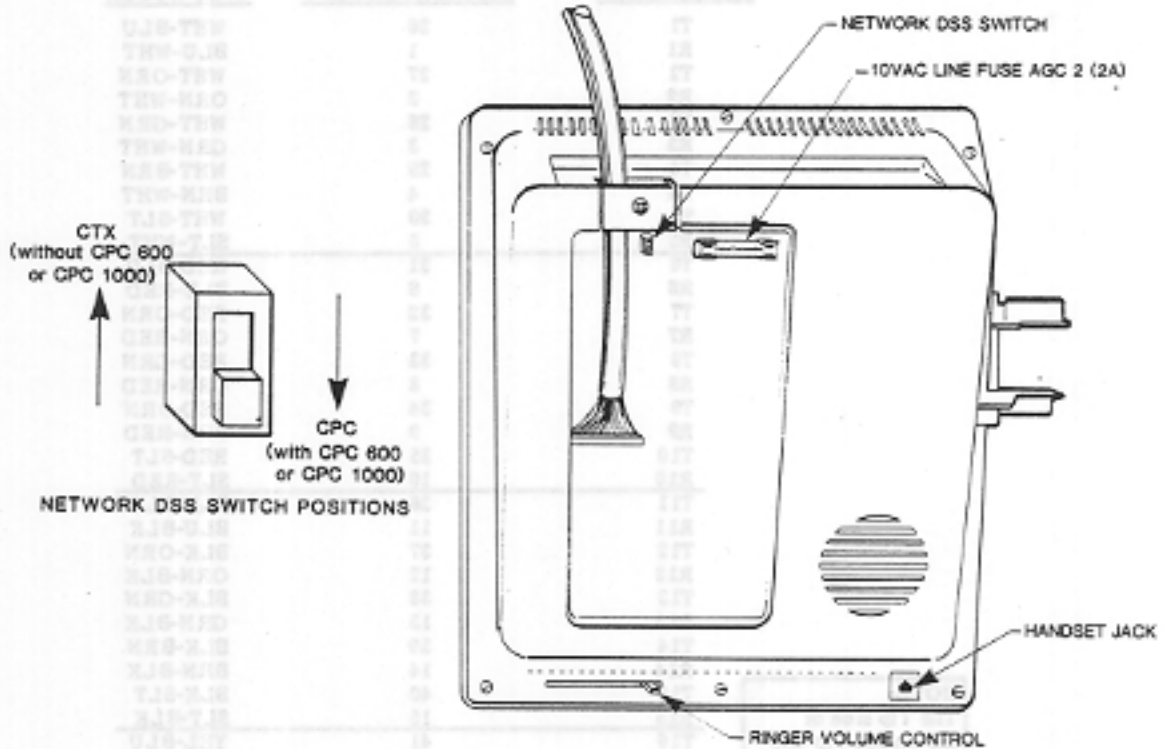

LOCK NUT

ADJUSTABLE FOOT

The rear feet may be adjusted to change the angle of the consoles. Remove the rear feet and install the black plastic nuts (shipped in the handset cradle bag) on the threaded studs. Screw the feet into the consoles until the desired angle is achieved, then tighten the nuts against the console housing.

Connecting the Handset

HANDSET JACK

Plug the provided handset cable into the handset and the jack beneath the front left edge of the console.

Doc. #13-101942 Rev. K

The Network DSS Switch

CTX
(without CPC 600
or CPC 1000)

CPC
(with CPC 600
or CPC 1000)

NETWORK DSS SWITCH POSITIONS

- NETWORK DSS SWITCH
- —10VAC LINE FUSE AGC 2 (2A)
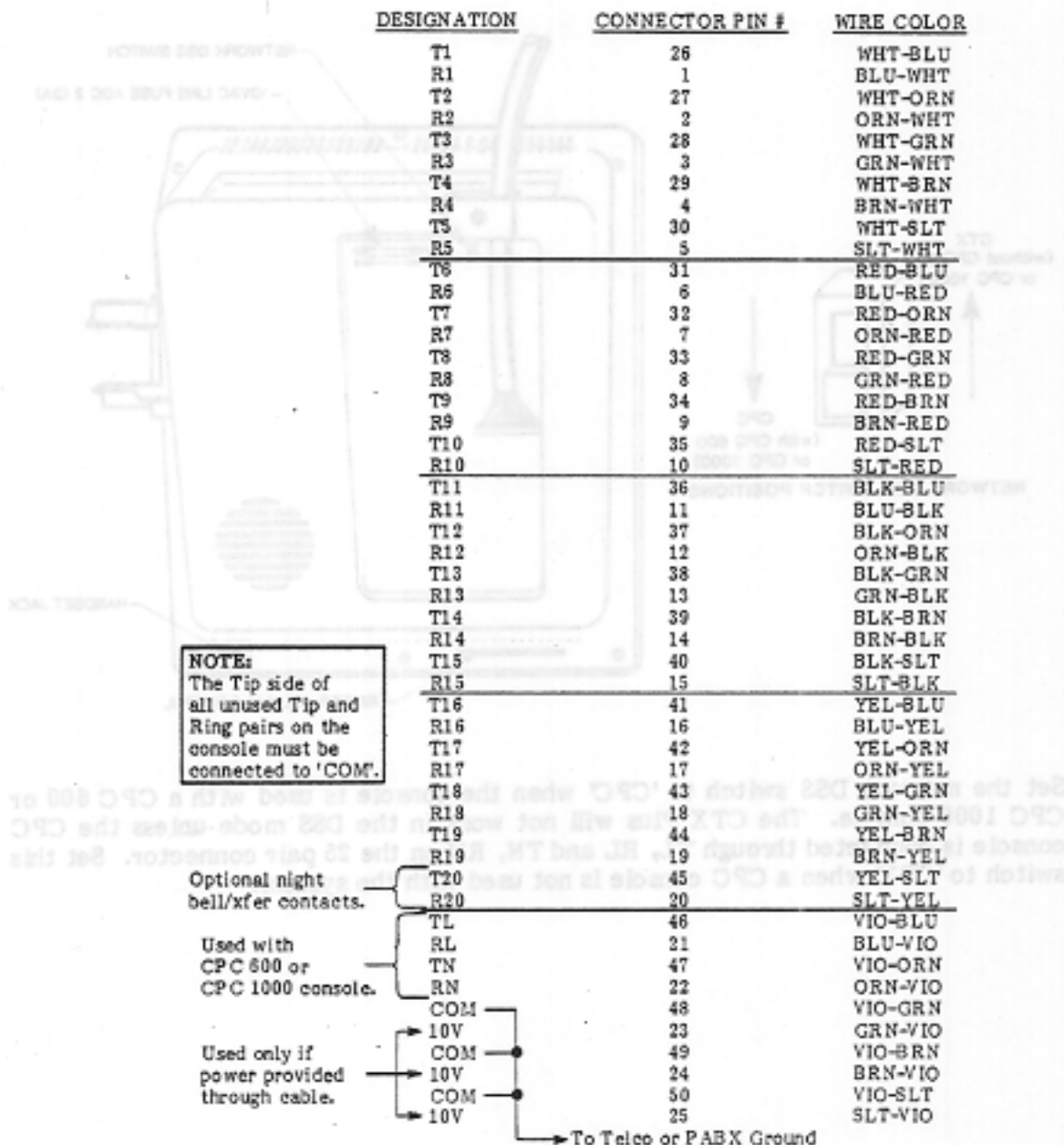- HANDSET JACK
- RINGER VOLUME CONTROL

Set the network DSS switch to 'CPC' when the console is used with a CPC 600 or CPC 1000 console. The CTX Plus will not work in the DSS mode unless the CPC console is connected through TL, RL and TN, RN on the 25 pair connector. Set this switch to 'CTX' when a CPC console is not used with the system.

Cabling and Connection Block

DESIGNATION	CONNECTOR PIN #	WIRE COLOR
T1	26	WHT-BLU
R1	1	BLU-WHT
T2	27	WHT-ORN
R2	2	ORN-WHT
T3	28	WHT-GRN
R3	3	GRN-WHT
T4	29	WHT-BRN
R4	4	BRN-WHT
T5	30	WHT-SLT
R5	5	SLT-WHT
T6	31	RED-BLU
R6	6	BLU-RED
T7	32	RED-ORN
R7	7	ORN-RED
T8	33	RED-GRN
R8	8	GRN-RED
T9	34	RED-BRN
R9	9	BRN-RED
T10	35	RED-SLT
R10	10	SLT-RED
T11	36	BLK-BLU
R11	11	BLU-BLK
T12	37	BLK-ORN
R12	12	ORN-BLK
T13	38	BLK-GRN
R13	13	GRN-BLK
T14	39	BLK-BRN
R14	14	BRN-BLK
T15	40	BLK-SLT
R15	15	SLT-BLK
T16	41	YEL-BLU
R16	16	BLU-YEL
T17	42	YEL-ORN
R17	17	ORN-YEL
T18	43	YEL-GRN
R18	18	GRN-YEL
T19	44	YEL-BRN
R19	19	BRN-YEL
T20	45	YEL-SLT
R20	20	SLT-YEL
TL	46	VIO-BLU
RL	21	BLU-VIO
TN	47	VIO-ORN
RN	22	ORN-VIO
COM	48	VIO-GRN
10V	23	GRN-VIO
COM	49	VIO-BRN
10V	24	BRN-VIO
COM	50	VIO-SLT
10V	25	SLT-VIO

NOTE:
The Tip side of all unused Tip and Ring pairs on the console must be connected to 'COM'.

Optional night bell/xfer contacts.

Used with CPC 600 or CPC 1000 console.
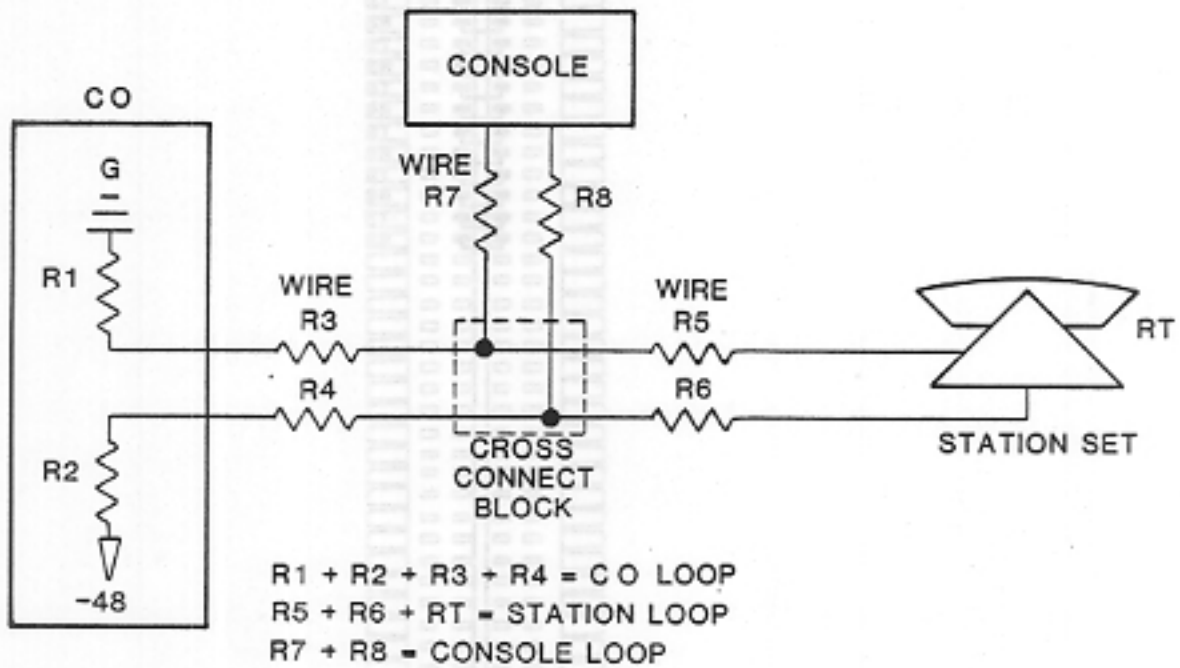
Used only if power provided through cable.

→ To Telco or PABX Ground

Run a 25 pair cable from the console location to the telephone equipment room. The cable must have a female connector at the console end; plug the console into this connecton.

In the equipment room, punch down the cable to the right side of a 66M1-50 split block (or use a connectorized block). Label the block as shown in the 'designation' column of the table above.
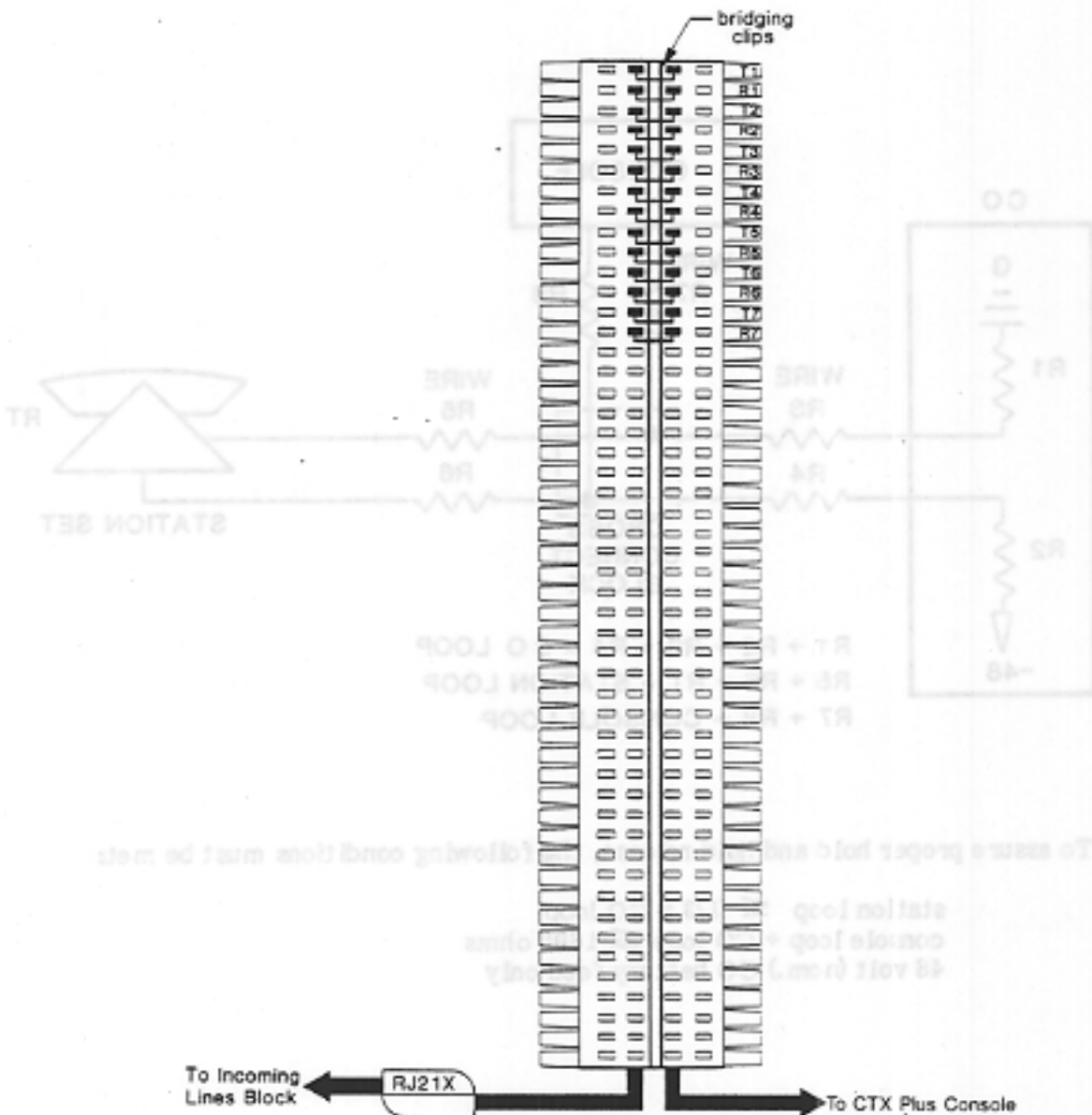
Loop Limits

$$R1 + R2 + R3 + R4 = CO\ LOOP$$
$$R5 + R6 + RT = STATION\ LOOP$$
$$R7 + R8 = CONSOLE\ LOOP$$

To assure proper hold and hold release, the following conditions must be met:

$$station\ loop \le 1/3 \times CO\ loop$$
$$console\ loop + CO\ loop \le 1600\ ohms$$

48 volt (nom.) CO battery feed only

Cross Connections to the Central Office or PABX

Punch down a 25 pair cable with a female connector to the left side of the CTX Plus block. This cable plugs into the RJ21X connector provided by the telephone company for incoming lines. Use bridging clips to connect active lines to the CTX Plus cable.

Incoming lines may be cross connected directly to the CTX Plus block in a PABX installation.

Cross Connections to a CPC Console

CTX Plus Block

CPC Block
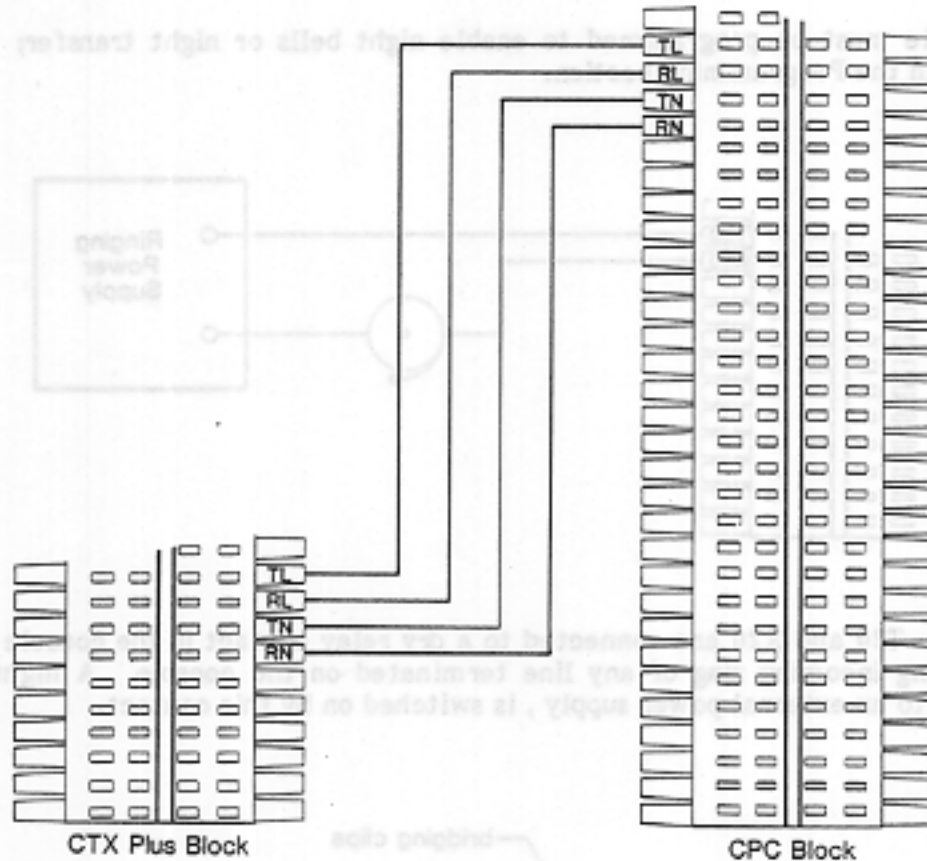
Cross connect TL, TN, RL, and RN to the same-labeled pins on the CPC 600 or LM 1000 (CPC 1000) block. Refer to the CPC 600 or LM 1000 Installation Instructions when installing multiple CPC consoles.

Paging

Paging can be accessed from a spare line key. If a local paging system such as the Tone commander PCU 8 is used, it must provide talk battery to the console. Cross connect the paging system input to T and R of the spare line key.

Night Service

Line 20 key on the CTX Plus-20 model may be used to enable a night bell, or to switch the telephone system into night transfer mode. The night feature is toggled on or off when the line key is pressed.

The console must be programmed to enable night bells or night transfer; this is explained in the Programming section.
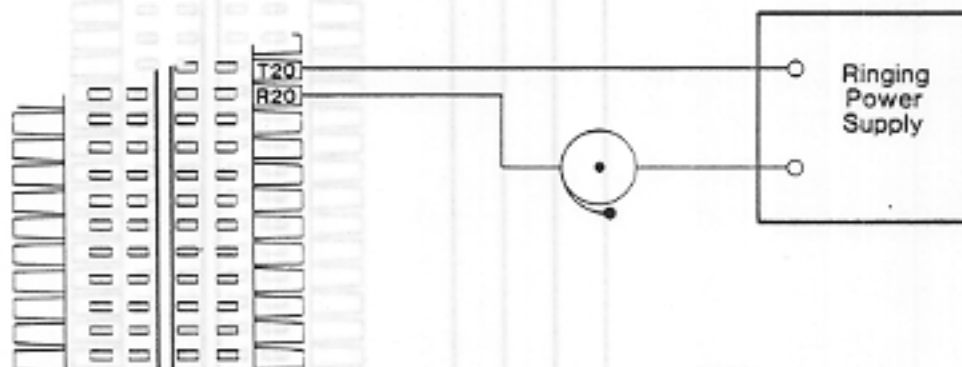

Night bell: T20 and R20 are connected to a dry relay contact in the console which closes during incoming ring of any line terminated on the console. A night bell, connected to an external power supply , is switched on by this contact.
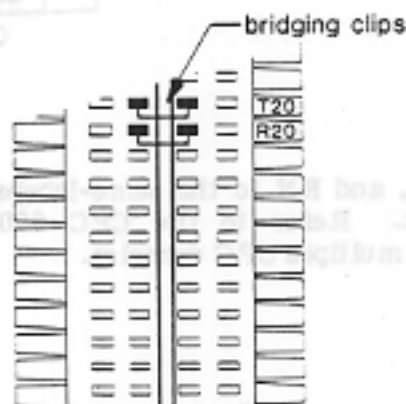

Night transfer: T20 and R20 are connected to a dry relay contact in the console which remains closed until the line 20 key is pressed again. These pins connect to the night transfer leads from the CO. The night transfer leads must appear on the YEL-SLT/SLT-YEL pair of the incoming lines cable, if you want to use bridging clips, otherwise cross connect as required.

Power
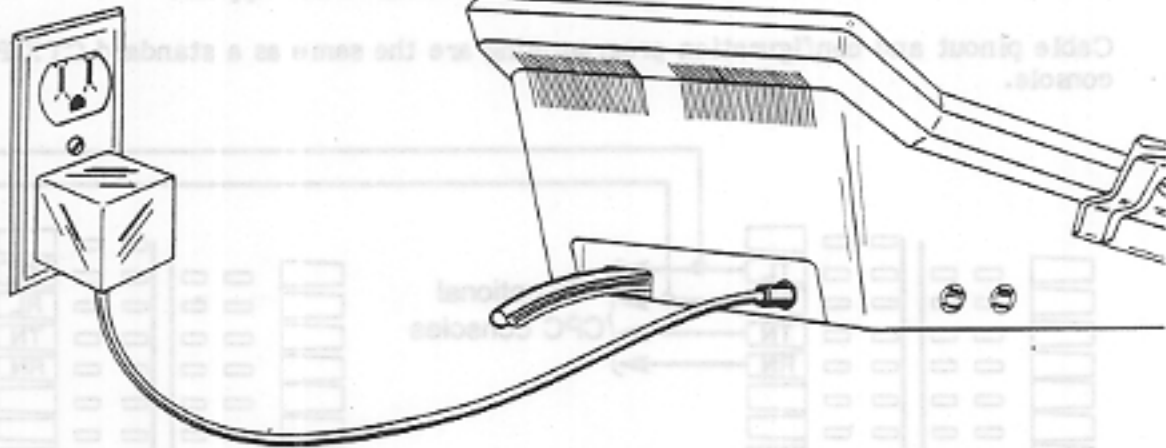
The wall plug-in transformer provided with the CTX Plus may be used to power the console. Plug the transformer's cable into the jack on the back of the console.

NOTE: The VIO-GRN, VIO-BRN, and VIO-SLT leads must be connected to telco or PABX ground for proper operation.
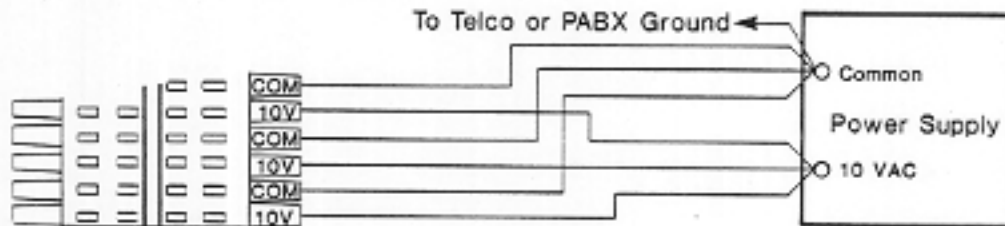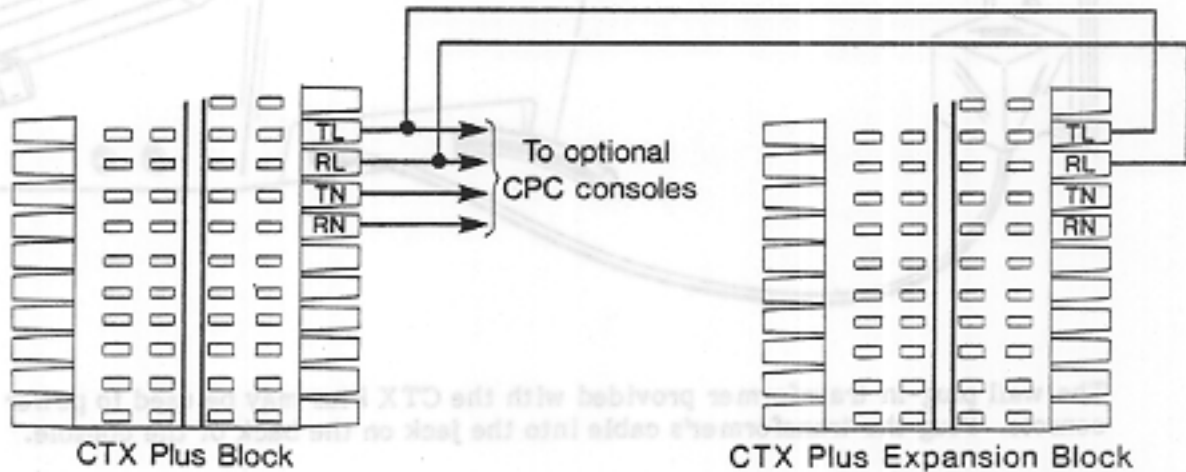

Another option is to provide power through the 25 pair cable (100 ft. maximum cable length). The power source may be the power output of an LM 600 Line Monitor, an MWI 600 Line Monitor with Message Waiting Interface, or a separate power supply (Tone Commander T-105A or equivalent). All three power pairs must be individually connected to the power supply.

Connect 'common' to telco or PABX ground.

CTX Plus Expansion Console

The CTX Plus Expansion Console allows two or more consoles to be operated by one attendant using a single handset or headset. Dialing is accomplished via the primary console dial pad or the CPC console(s). Hold, transfer, and release must be activated on the same console on which the accessed line appears.

Cable pinout and configuration programming are the same as a standard CTX Plus console.

Cross connect 'TL' and 'RL' on the expansion console block to 'TL and 'RL' on the primary console block. The expansion console's 'TN' and 'RN' must not be connected. If a CPC console is used, cross connect it to the primary console block only.

CONFIGURATION PROGRAMMING

These programming instructions are intended for the installer. The attendant may change only the ringing delay for each line; this procedure is explained in the Using the CTX Plus Console section.
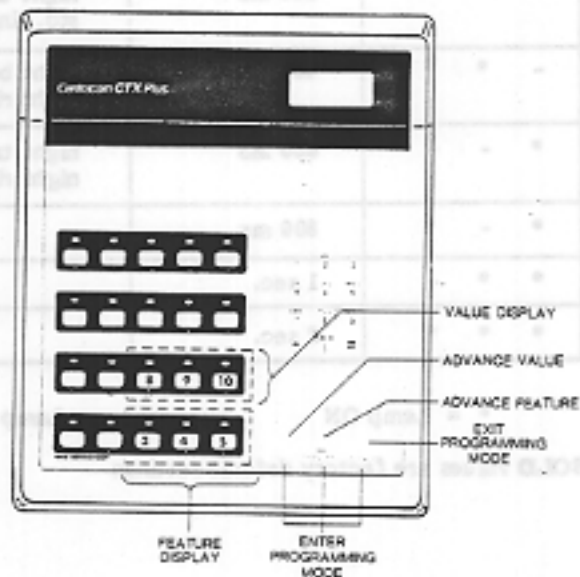
NOTE: Programming mode should not be entered while any line is active.

- Press and hold down TRANSFER and RELEASE, the press HOLD to enter the configuration programming mode. The console will beep twice.

- The code display on line lamps 3, 4, and 5 indicate which feature is being examined or programmed.

- Press TRANSFER to advance to the next feature.

- Line lamps 8, 9, and 10 show the value selected for the feature being programmed.

- Press HOLD to advance to the next value.

- Ringing Delay and Line Privacy are programmable on a per line basis. Press the key to be programmed; its line lamp will blink (line 1 comes up when first selecting the feature). HOLD changes the value. If the lamp for the line being programmed is also a feature or value indicator (line lamps 3-5 or 8-10), it will wink for an 'ON' (*) indication, and blink for an 'OFF' (-) indication.

- Press RELEASE to exit configuration programming mode, and return to normal operation. The console will beep once.

- Programming is retained when power is removed from the console.

PROGRAMMABLE FEATURE SELECTION

DISPLAYED CODE			FEATURE
3	4	5	
-	-	-	RINGING DELAY
-	-	*	HOOKSWITCH FLASH TIME
-	*	-	HOLD RECALL TIME
-	*	*	ABANDONED RING TIME
*	-	-	HOLD RELEASE TIME
*	-	*	NIGHT RELAY MODE
*	*	-	LINE PRIVACY
*	*	*	#5 ESS

* = Lamp ON - = Lamp OFF

VALUE DISPLAY
ADVANCE VALUE
ADVANCE FEATURE
EXIT PROGRAMMING MODE

FEATURE DISPLAY   ENTER PROGRAMMING MODE

Installer Programming

CONFIGURATION PROGRAMMING

PROGRAMMABLE VALUE SELECTION

DISPLAYED CODE			RINGING DELAY	HOOKFLASH TIMING	HOLD RECALL TIMING	ABANDONED RING TIMING
8	9	10				
-	-	-	**NO DELAY**	400 ms	30 sec.	2 sec.
-	-	*	1 ring	500 ms	40 sec.	3 sec.
-	*	-	2 rings	600 ms	50 sec.	**4 SEC.**
-	*	*	3 rings	**700 MS**	60 sec.	5 sec.
*	-	-	4 rings	800 ms	**90 SEC.**	6 sec.
*	-	*	5 rings	900 ms	2 min.	7 sec.
*	*	-	6 rings	1 sec.	3 min.	8 sec.
*	*	*	no ringing	1.1 sec.	no recall	10 sec.

DISPLAYED CODE			HOLD RELEASE TIMING	NIGHT RELAY MODE (LINE 20 KEY)	LINE PRIVACY	#5 ESS
8	9	10				
-	-	-	20 ms	**NORMAL LINE**	**NO PRIVACY**	NO
-	-	*	70 ms	night bell with std. ring delays	private if busy	yes
-	*	-	200 ms	night transfer with std. ring delays		
-	*	*	400 ms	night bell with night ring delays		
*	-	-	**600 MS**	night transfer with night ring delays		
*	-	*	800 ms			
*	*	-	1 sec.			
*	*	*	2 sec.			

* = Lamp ON   - = Lamp OFF

BOLD values are factory default settings

Ringing Delay

Ringing at the console may be set to begin after the station rings, programmable per line. The delay is set in the number of ringing cycles. A line may also be programmed to never ring at the console. Abandoned Ring Time must be correctly set for this feature to operate properly. (Factory default is no delay.)

CTX PLUS 20 only - Night Bell/Transfer with Night Mode Ring Delays
Ring delay values can be programmed per line for "Night Mode" operation, in addition to values programmed for normal usage. Night mode ring delay programming is performed as described above when "Night mode" is initiated by pressing line 20 key.

Hookflash Timing

The Transfer key opens the line loop for a preselected time, simulating a hookflash. If you have intermittent call transfer problems, increase the Hookflash Timing value.

Hold Recall Timing

The Hold Recall Timing determines the length of time before a call put on hold at the console will recall to the attendant.

Abandoned Ring Timing

The console measures the time between ringing bursts. When the quiet interval exceeds the Abandoned Ring Time it is assumed that the caller has hung up and ringing is turned off for that line. Set the Abandoned Ring Timing slightly longer than the silent period between rings. If set too short, the line lamps will stop flashing in the middle of a normal ringing cycle and an odd ringing pattern may occur. Four seconds provides an adequate setting for most systems.

Hold Release Timing

When a CO detects that a party has hung up, it signals to the other party with a momentary break in loop current. The time interval of the break varies depending on the central office. There can be momentary breaks of shorter time intervals for other reasons as well. The CTX Plus console measures these breaks in order to disconnect when a call on hold hangs up. Consult the telephone company to determine length of the disconnect break time. Set Hold Release Timing to the time interval that is slightly less than the disconnect signal of the CO.

Night Relay Mode

(CTX Plus-20 model only.) Line 20 Key may be used as a line key, a night transfer key, or for the night bells. Night service modes may use optional night ringing delays. Refer to the Specifications section for further description of night service modes.

Line Privacy

This feature determines whether the console may access a line that is in use by that line's station, programmable per line.

#5 ESS Operation

This selects console functions for compatibility with #5 ESS central offices. If optioned for #5 ESS, call privacy is disabled during valid incoming ringing.

USING THE CTX PLUS CONSOLE

IMPORTANT:

To avoid losing calls, wait for supervisory tones (dial tone, busy tone, or ringing) before dialing or pressing TRANSFER or RELEASE. Any delay in receiving these tones is caused by the telephone system, not the CTX Plus console.

To answer an incoming call:

- When the phone rings, the red lamp for the incoming call line will flash.
- To answer the call, press the key for the ringing line.

(line)

To place a call:

- Press and idle line key.
- Wait for dial tone.
- Dial the number with the dial pad.

(line)

To end a call:

- Press RELEASE. The line the handset or headset was connected to will 'hang up'.

RELEASE

To place a call on hold:

- Press HOLD.
  -or-

- Press another line key, to answer or place a call.
  The first call is automatically placed on hold.

```
[   ]
HOLD
```

As a reminder to the attendant, calls on hold longer than programmed 'hold recall time' will begin ringing. These calls can be differentiated from an incoming call by the ringing pattern and lamp flashing rate.
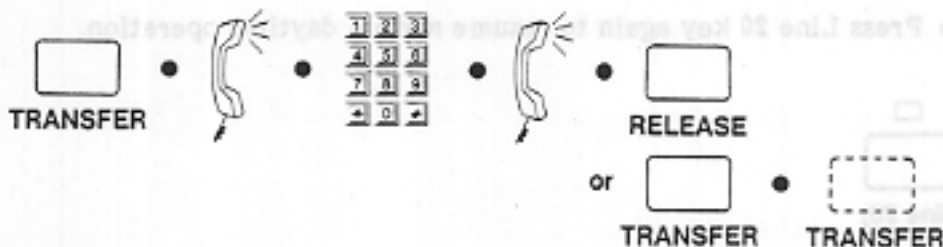
To reconnect to a call on hold:

- Press the line key for the held line.

```
[■]
(line)
```

To transfer a call (unscreened):

- Press TRANSFER.

- Wait for dial tone.

- Dial the station where the call will be transferred to.

- If the station rings, press RELEASE.

- If the station is busy, press TRANSFER twice to reconnect to the caller.
  (On some telephone systems, press TRANSFER once.)

```
[   ]          [123]          [   ]
TRANSFER       [456]          RELEASE
               [789]
               [*0#]       or [   ]  •  [ - - ]
                              TRANSFER    TRANSFER
```

To transfer a call (screened):

- Press TRANSFER.

- Wait for dial tone.

- Dial the station where the call will be transferred to.

- Wait for the called party to answer, and ask them if they will accept the transferred call.

- If yes, press RELEASE.

- If no, wait for the called party to hang up; you will then be reconnected to the caller. (On some telephone systems, press TRANSFER once or twice to reconnect.)
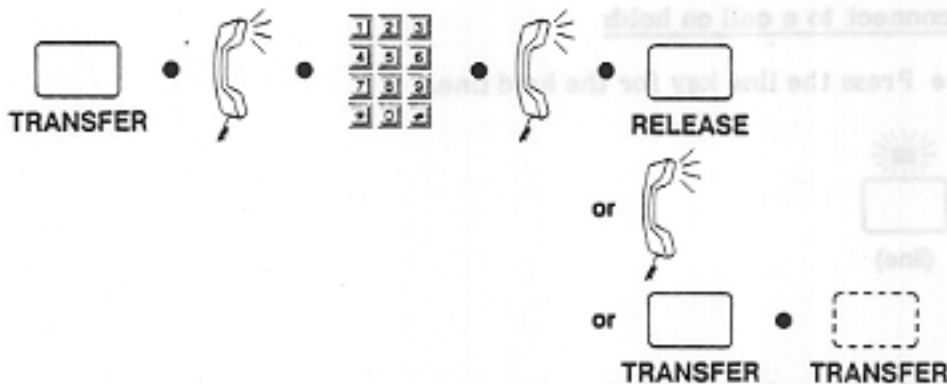
TRANSFER • 📞 • ⌨️ • 📞 • RELEASE

or 📞

or TRANSFER • TRANSFER

To activate night transfer or night bells, if installed in your system:

- Press Line 20 key.

    Night Bells - Incoming calls will ring over the night bell system, if installed, in addition to ringing at the console.

    Night Transfer - Incoming calls will ring at the night transfer stations, as programmed by the telephone company.

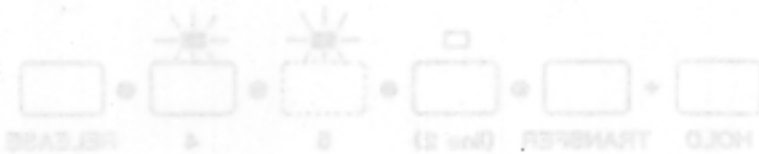- Press Line 20 key again to resume normal daytime operation.

(line 20)
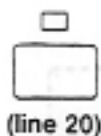
<u>To set the clock:</u>

- Press FAST to rapidly cycle the clock display forward.
- Press SLOW to slowly approach the correct time.

```
┌──────┐ • ┌──────┐
└──────┘   └──────┘
 FAST       SLOW
```

<u>To use a headset:</u>

- Plug the headset into the headset jacks. This disconnects the handset's transmitter.
- The handset may still be used for listening.
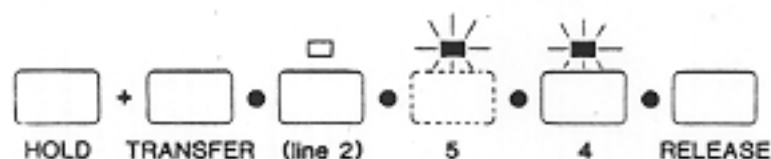
Ringing Delay Programming

Each line may be programmed by the attendant to ring at the console always (bell ON), never (bell OFF), or after it has rung from 1 to 6 rings at the station that line is connected to. Only one line may be programmed at a time.

- Press HOLD and TRANSFER simultaneously to enter the attendant programming mode. The console will beep twice, and no lamps will be lit.

- Press the line key to be programmed; the console will beep twice. The display shows the number of rings selected, as shown in the figure on the facing page.

- Press the key under the indicator for the number of rings (i.e., key 2 for 2 rings, key 7 for no ringing, or key 8 for no delay); the console will beep twice.

  NOTE: Version 03 consoles and prior, use key 7 for no delay, and key 8 for no ringing.

- The attendant programming mode must be exited and reentered to program another line.

- Press RELEASE to exit the programming mode, and return to normal operation. The console will beep once.

For example, to program line 2 to ring at the console after 4 rings at the station (was set to 5 rings):

HOLD   TRANSFER   (line 2)   5   4   RELEASE

Night Ringing Delays

CTX Plus consoles version 04 and later allow the use of separate ringing delay settings when night transfer or night bells are in operation. The version number is located on a label on the bottom of the console.

To program night ringing delays, first enable night transfer or night bells by pressing Line 20 key. The lamp above the key will flash/flicker. Proceed with programming as explained above (Ringing Delay Programming).

Standard (daytime) ringing delays must be programmed when the console is NOT in night mode.

Expansion Console Operation

Use the dial pad on the primary CTX Plus console, or autodial keys on a CPC Call Processing Console, to dial lines accessed on the expansion console. Hold, transfer, and release must be activated on the same console on which the accessed line appears.

NOTE: The automatic hold feature is not available when accessing a new line between consoles. If done, this will directly connect two outside lines and reduce the performance of the units.
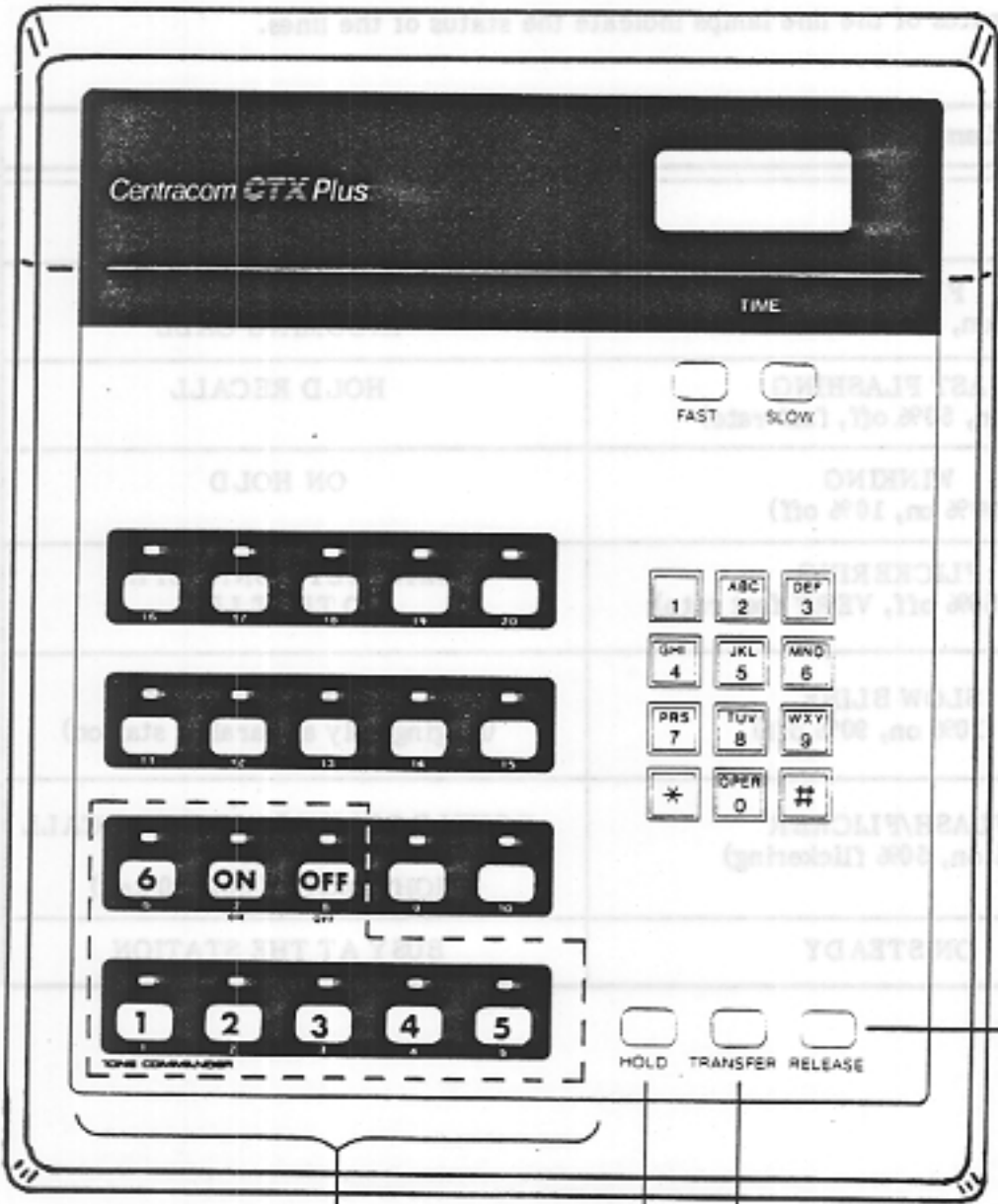
NUMBER OF RINGS

ENTER
PROGRAMMING
MODE

EXIT
PROGRAMMING
MODE

LAMP TABLE

The on/off rates of the line lamps indicate the status of the lines.

Lamp Condition	Line Status
OFF	IDLE
FLASHING (50% on, 50% off, slow rate)	SINGLE RINGING INCOMING CALL
FAST FLASHING (50% on, 50% off, fast rate)	HOLD RECALL
WINKING (90% on, 10% off)	ON HOLD
FLICKERING (50% on, 50% off, VERY fast rate)	HANDSET CONNECTED TO THAT LINE
SLOW BLINK (10% on, 90% off)	DELAYED RINGING (ringing only at parallel station)
FLASH/FLICKER (50% on, 50% flickering)	DOUBLE RINGING INCOMING CALL or NIGHT MODE (Line 20 key)
ON STEADY	BUSY AT THE STATION

RINGING TABLE

The console ringing pattern varies with the line status.

When a line is accessed and another line rings, the ringing tone is abbreviated. This feature allows attendants to process calls with less background ringing at the console.

CTX PLUS CONSOLE RINGING TABLE

Ringing State	Line Status
RINGING (1 ring burst every 4 seconds) DOUBLE RINGING (2 ring bursts every 4 seconds)	INCOMING CALL ON ANY LINE *
RECALL (3 ring bursts every 4 seconds)	HOLD RECALL TIME-OUT ON ANY LINE
BEEP	ACTIVE LINE RELEASED (with Release key)
DOUBLE BEEP	PROGRAMMING MODE ENTERED

*Incoming call ringing rate is determined by the source of the call, and depends upon the type of telephone system the CTX Plus console is connected to. Consult with the telephone installing company for your system's ringing rates.

SERVICE

Maintenance and repair on the CTX Plus must be done by Tone Commander. If the unit is defective, please contact:

TONE COMMANDER®

CUSTOMER SERVICE ENGINEERING DEPARTMENT
Box 97039 • 4320 150th Avenue NE
Redmond, WA 98073-9739 USA
Phone: (206) 883-3600   Telex: 15-2246

WARRANTY

For a period of one year from date of manufacture, Tone Commander Systems, Inc. (Tone Commander) warrants its products to be free from defects in material and workmanship under conditions of normal use and service. Tone Commander shall, at its option, repair or replace any defective product which in its opinion has not been misused, damaged, or improperly installed.

Repair or replacement under this warranty will be performed at Tone Commander's factory. Authorization for return (with freight prepaid) must be obtained from Tone Commander prior to returning a product.

Products beyond the warranty period may be repaired at the factory for a reasonable charge. Repaired out-of-warranty units are warranted as above for 90 days from the date of repair.

A handling charge will be assessed on all units, in or out of warranty, that are returned and found to be free of defects.

The repair or replacement of a product under this warranty represents the entire obligation of Tone Commander; and Tone Commander shall not be liable for any special or consequential damages resulting from or caused by any defect, failure, incapacity or malfunction of any of its products.

The foregoing express warranty is in lieu of all other warranties, express or implied, including but not limited to, any implied warranty of merchantability, fitness or adequacy for any purpose or use, quality, productiveness or capacity; and Tone Commander, to the extent permitted by law, hereby disclaims all such other warranties.

CTX PLUS CONFIGURATION SHEET
LINE PROGRAMMABLE FEATURES

(DEFAULT SETTINGS FOR ALL LINES ARE *NO PRIVACY* AND *NO DELAY*.)

LINE NUMBER	PRIVACY WHEN BUSY		STANDARD RING DELAY (NO RINGING, NO DELAY, 1-6 RINGS)	NIGHT RING DELAY (NO RINGING, NO DELAY, 1-6 RINGS)
	YES	NO		
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

CTX PLUS CONFIGURATION SHEET
SYSTEM PROGRAMMABLE FEATURES

FEATURE	AVAILABLE VALUES	DEFAULT VALUE	ACTUAL VALUE
HOOKFLASH TIME	400, 500, 600, 700, 800, 900 ms 1, 1.1 sec	700 ms	
HOLD RECALL TIME	30, 40, 50, 60, 90 sec 2, 3 min; no recall	90 sec	
ABANDONED RING TIME	2, 3, 4, 5, 6, 7, 8, 10 sec	4 sec	
HOLD RELEASE TIME	20, 70, 200, 400, 600, 800 ms 1, 2 sec	600 ms	
NIGHT MODE	normal line night bell + std. ring delays night transfer + std. ring delays night bell + night ring delays night transfer + night ring delays	normal line	
#5 ESS	no, yes	no	

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This addendum gives additional information for installing CTX Plus consoles prior to version 04.

Console Version Identification

The version number is located on the bottom of the console, on the FCC label.

CTX Plus consoles prior to version 03 do not have the version number on the label. Use the serial number, also on the bottom of the console, to determine if the information on page 2 is applicable.

In addition to the changes on this page, consoles with the following serial numbers have the Abandoned Ring Time values listed on page 2:

> X5 prefix, 01605 and below
> X0 prefix, 01172 and below

Features for All Consoles Prior to Version 04

1. No separate night ringing delays.
    Standard ringing delay settings will be in effect for both the console ringer and the optional external night ringer, when the console is in night bells or night transfer mode.

2. No short burst (100ms) ringing when a line is accessed by the console.

3. Hold recall will ring over the night bell.

4. No switch selection for ESS #5 systems.
    Operation with ESS #5 systems may require a line class of service of 'grd ref=y' to ensure correct response to incoming ringing calls. This class of service can cause longitudinal imbalance of the line, with increased susceptibility to noise.

Early revision CTX Plus consoles may be upgraded by the factory to version 04 for a $100 fee.

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For greater compatibility with customers' telephone systems, all new and repaired CTX Plus consoles are currently being shipped with new Abandoned Ring Time values. Early models have the values shown in the center column of the table below.

ABANDONED RING TIME

DISPLAYED CODE			SERIAL NUMBERS X5-01605 X0-01172 AND BELOW	ALL LATER UNITS
8	9	10		
-	-	-	2 sec.	2 sec.
-	-	*	4 SEC.	3 sec.
-	*	-	6 sec.	4 SEC.
-	*	*	8 sec.	5 sec.
*	-	-	10 sec.	6 sec.
*	-	*	12 sec.	7 sec.
*	*	-	16 sec.	8 sec.
*	*	*	20 sec.	10 sec.

BOLD values are factory default settings.