



Tomorrow's Telemetry Today!

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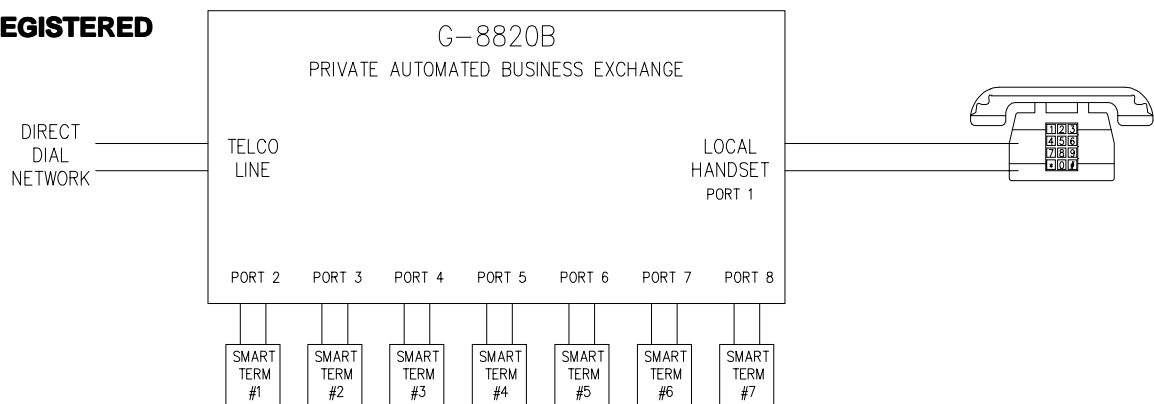
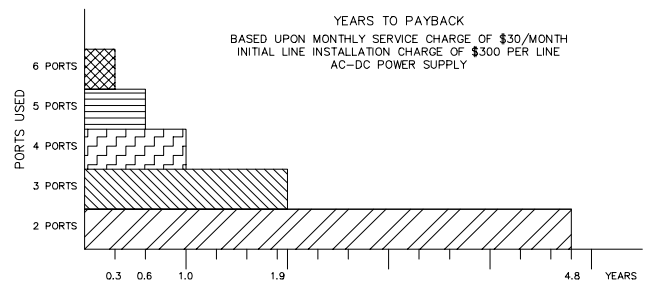
INSTRUCTION INFORMATION FOR THE G-8820B PRIVATE AUTOMATIC BUSINESS EXCHANGE



- * **PATENTED FEATURES**
- * **SWITCH-SELECTABLE OPTIONS**
- * **PRIORITY PORT BACK-UP**
- * **DTMF-TO-PULSE CONVERSION**
- * **TRANSIENT PROTECTION**
- * **EASY INSTALLATION**
- * **PUBLIC OR PRIVATE LINE SELECTION**
- * **SINGLE OR REPEATED CALL FORMAT**
- * **CALLER- OR MODEM-TRANSPARENT**
- * **SOLID STATE SWITCHING**
- * **DYNAMIC DTMF LEVEL DECODING**
- * **FCC REGISTERED**

GENERAL DESCRIPTION

As more smart terminals are being installed in substations, a conflict has arisen. When a master computer dials and accesses the substation, to which terminal should the call be directed? The simple solution is to add telephone lines, one per each smart terminal. However, this is not cost effective when considering the monthly telephone service billing. To solve the problem, Da-Tel Research Company has developed a small, automatic device to direct incoming calls to the correct smart terminal. The device is the G-8820B Private Automated Business Exchange (PABX).



Electrically, the PABX is between the telephone line, a local handset, and any smart terminals. One PABX can support up to seven smart terminals and one handset.

FEATURES OF G-8820B

INCOMING CALL PORT SELECTION

After the G-8820B PABX goes off-hook, the incoming call can be directed to 1 of 8 ports. The command used to select a port is a DTMF burst sent from the calling station. If the call is not directed, it will be routed to port 1 by default.

POWER DOWN MODE AND WATCHDOG TIMER

During a primary power failure, a failure of a shelf's power supply, or a microprocessor failure detected by the watchdog timer, the incoming telephone line is switched to the priority port, port number 1.

LOCAL RING GENERATOR AND LOOP SUPPLY

The G-8820B PABX provides the local ring generator and loop supply for all 8 ports. The loop supply and the ringing of a port are identical to these same functions in a typical direct dial network.

FRONT PANEL CALL PROGRESS INDICATION

Complete visual indication of the progress of both incoming and outgoing calls is provided on the front panel. The points indicated are incoming call, terminal off-hook, local ringing, and the active port.

AC OR DC PRIMARY POWER

The G-8820B can be powered from station ac or dc battery banks. For ac operation, 120 or 220 Vac, the modular G-8700-F Power Supply provides all power required for the G-8820B. Dc operation requires a G-7800 series modular converter. All standard station battery potentials are supported.

EXTENDED TEMPERATURE RANGE

The G-8820B PABX has an operational temperature range of -25° to +75°C, allowing operation in harsh sub-station environments.

PORT PRIORITY FOR OUTGOING CALLS

Port 1, typically used for the handset, has line priority over the other ports. For example, if a call is in progress on port 2 and port 1 goes off-hook, port 2 will be disconnected and the line switched to port 1. This, however, does not ensure that the modem previously communicating with port 2 will recognize the disconnect and end communication. The G-8820B will then disconnect from the telephone line long enough for the telephone exchange to drop off, return off-hook, and connect port 1 to the telephone line. The disconnect time required depends on the telephone exchange and varies from one to another. The required delay may be set with S6 and S7. For setting details see page 5.

RING DURATION

When an incoming call is received, the selected port will ring until the originating station hangs up, redirects the call to an alternate port, or enters the “#” sign, causing the G-8820B to immediately disconnect. If neither of the above occurs the G-8820B will return on-hook after 12 or 64 rings, selected by S5. See page 5.

RING COMPENSATION

The G-8820B has a ring trip circuit used to detect when a device connected to a PABX port goes off hook during the ringing cycle. The ring trip circuit is sensitive to the PABX ring voltage and length of line extending from a PABX port to the connected device. As a result of this sensitivity the ring trip circuit can trip itself if not correctly matched to the device to be rung. To match the ring circuit to the device to be rung three compensation jumpers are available, J4, J5 and J6. These jumpers may be installed in any fashion: all out, 1 in and 2 out, 2 in and 1 out, or all in.

The symptom is exhibited when a phone that is being rung from the PABX port does not ring a full second but immediately stops. What is heard is a quick burst, possibly only a single ring bell. By installing a combination of these jumpers this problem can be resolved.

CALLER- OR MODEM-TRANSPARENT OPERATION

To ensure that the G-8820B PABX will not interfere with incoming calls, two field-selectable modes of operation are available: caller-transparent operation and modem-transparent operation.

In the caller-transparent mode with S1 switched to the left, the call progress will sound normal except for a short dual-beep heard once upon connection of the PABX. No action is required of a caller unfamiliar with the operation of the remote PABX. The call is answered by port one, the handset.

To reach a port other than the default, the caller must enter that port's DTMF steering code after hearing the dual-beep. The DTMF steering code is simply the port number entered using the DTMF touch-tone pad. Once the code is entered and received, the caller will again hear a dual-beep. This beep is the confirmation tone indicating that the steering code has been received and the call redirected.

In the modem-transparent mode with S1 switched to the right, the call will progress differently. Hayes-compatible modems can be configured to pause after dialing the station's number. The modem will then wait for a dial tone before completing its programmed sequence, the required port number. Therefore, the caller will hear a second dial tone in the ringing sequence. At this time, the caller must enter the steering code for the desired port.

A G-8820B in the caller-transparent mode can also be used with a Hayes-compatible modem. The modem configuration will be a different format than that used with the modem-transparent mode. Instead of using the wait command, the delay command or ',' symbol is used followed by the port number. The number of delay commands or commas used depends upon connection times. For example, the Hayes command string might be "2496129,,,,2,2,2".

In either the caller- or modem-transparent modes, the port one handset is not rung immediately. This allows time for the caller to enter the steering code without unnecessarily disturbing the local personnel. This steering window lasts for ten seconds in the caller-transparent mode and for five seconds in the modem-transparent mode. If the caller misses this window, the steering code can still be entered or changed until the port goes off-hook.

DTMF OR PULSE SIGNALING

DTMF-to-rotary pulse conversion is available for remote installations using telephone circuits that do not support DTMF signaling. When S2 is switched to the right, all outgoing DTMF signals are converted to rotary pulses. This allows modern smart terminals to call out of the location.

SINGLE OR MULTI-CALL FORMAT

At the end of communication, when the port returns on-hook, an optional second steering window opens if S3 is switched to the right. This is the redirect window during which another port can be rung without placing a second call through the telephone exchange. During this 10 second window, a dial tone is generated after which the remote PABX will disconnect from the telephone line.

PUBLIC DIRECT-DIAL NETWORK OR PRIVATE DIAL NETWORK

When the G-8820B is installed on the public direct dial network, a 2.0 second billing window is required. This occurs at the moment that the G-8820B goes off-hook and cuts the audio line through. This is the normal setting with S4 switched to the left. When installed on a private dial network, the 2.0 second delay is not required and S4 is switched to the right.

EASY FIELD INSTALLATION

Field installation of the G-8820B simply requires connection of the primary power to terminal block 3 located at the rear of the shelf. One should ensure that the correct power supply type is installed for ac or dc operation. All telephone connections are via RJ11 sockets, also located at the rear of the shelf.

DYNAMIC DTMF LEVEL DECODING

A major enhancement added to the G-8820B is dynamic DTMF level decoding. DTMF steering codes generated from a DTMF pad are quite high in level compared to those generated from a PC modem. To be able to adjust for this a compander circuit precedes the DTMF decoder circuit. To improve this circuit further notch filters have been added to attenuate the locally generated call progress tones. The result is reliable steering of the call from either a handset or modem.

TEST POINTS

Also located behind the front panel is a seven point diagnostic test socket with the following test points: DTMF sensitivity, call progress tone level, +5 Vdc regulator output, and dc common. See diagram on page 5.

CORPORATE EXPERTISE AND BACKGROUND

Da-Tel has worked with communication circuits for over 23 years in the substation environment. The application of our experience to the direct dial network began in 1982 with the development of an auto-answer modem for data gathering systems. The G-8820B is the result of that developmental work.

As with all Da-Tel Research Company products, the G-8820B carries a 1 year warranty from date of delivery.

For a demonstration of the G-8820B PABX, dial 1-800-324-8388 and ask for sales assistance. We can then set up an actual demonstration for your evaluation.

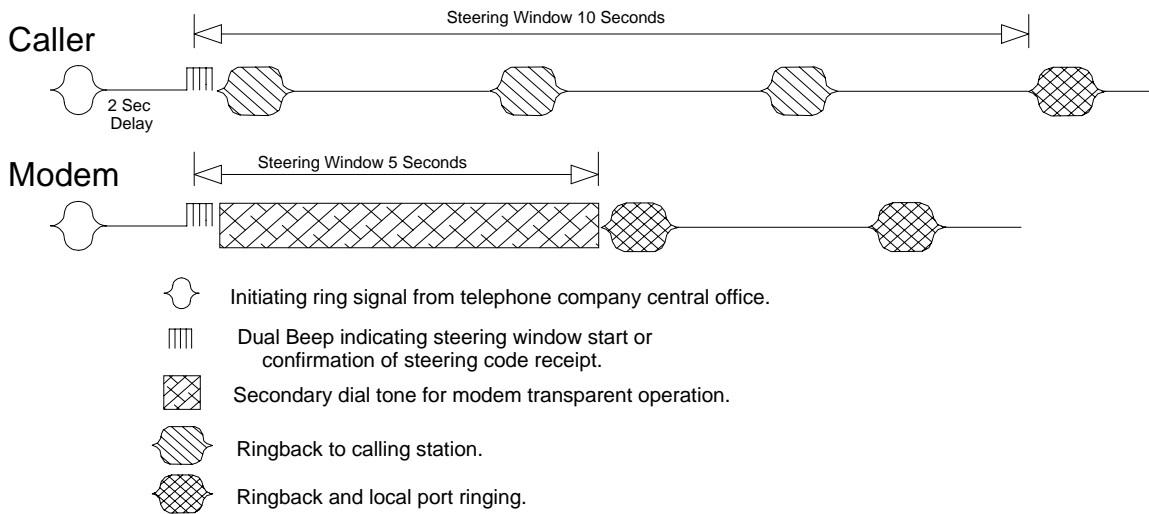
SPECIFICATIONS

LINE SIDE

FCC Registration # 1DF2MS-60420-TF-T	
Ringer Equivalence	1.0 B.
Received DTMF, minimum	-40 dBm.
Received Dial Tone, minimum	-40 dBm.
DTMF Detect Time	50 ms.
Optional Pulse Dialing	10 pps, 67/33 make/ break. 300 ms interdigit timing.
Optional Secondary Dial Tone	-9 dBm, 350 & 400 Hz.
Special Character Recognition	1-8 Steering code to corresponding device port. # Optional disconnect command.
Ring Signal Detect Time	50 ms.
Transient Protection	IEEE SWC C37.90 1978 design tested.

DEVICE SIDE

Audio Ports	8, Port 1 with priority over remaining 7 ports.
On-Hook Voltage	24 Vdc.
Off-Hook Loop Current	50 mA.
Ringing Voltage	350 Vp-p, 27 Hz.
Special Character Recognition	* Switch from pulse to DTMF within an out- going dialing string dur- ing optional DTMF to pulse dialing. Pulse transparent.
Transient Protection	IEEE SWC C37.90 1978 design tested.
Weight	6 pounds with power supply.
Operating Temperature Range	-25° to +75°C.
Humidity Range	0 to 95% non-condensing.
Signal Level Loss	3 dB.
Power Requirement	10 W.
Telephone Line & Device Termination	RJ11 jacks.



Caller vs. Modem Transparent Operation

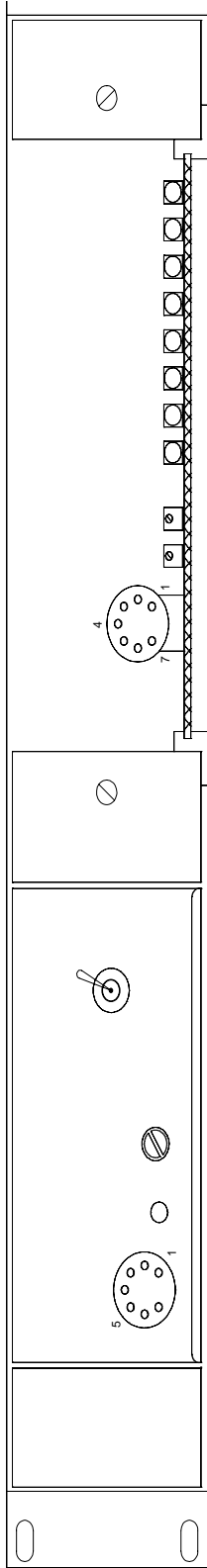
FRONT VIEW G-8820B PABX (COVER PLATE REMOVED)

G-8700 AC-DC OR G-7800 DC-DC
SERIES POWER SUPPLIES

TP2-7 DTMF SIGNAL LEVEL
dBm TYPICAL = 7dBm MAX

TP3-7 CALL PROGRESS TONE LEVEL
-3dBm NOMINAL

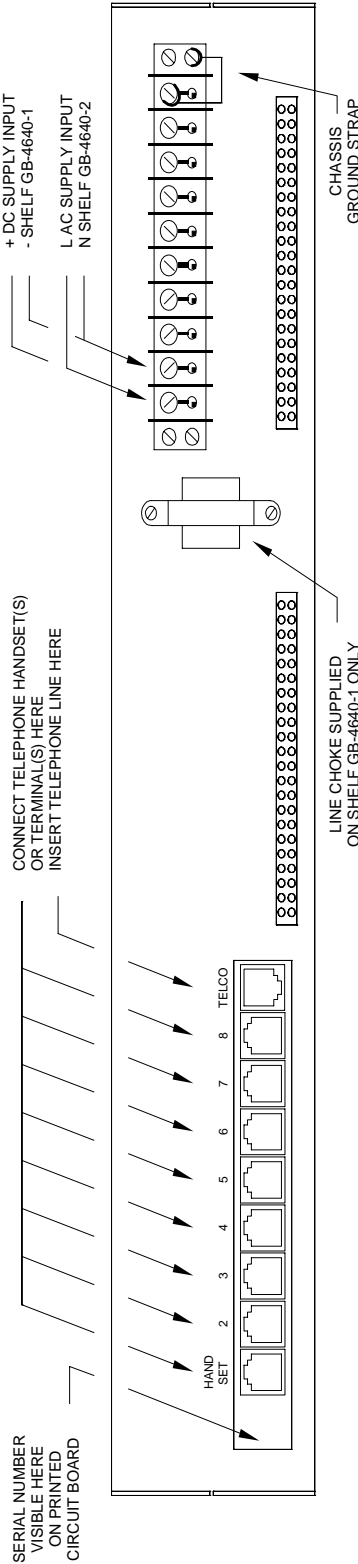
TP5-7 +5VDC INTERNAL SUPPLY



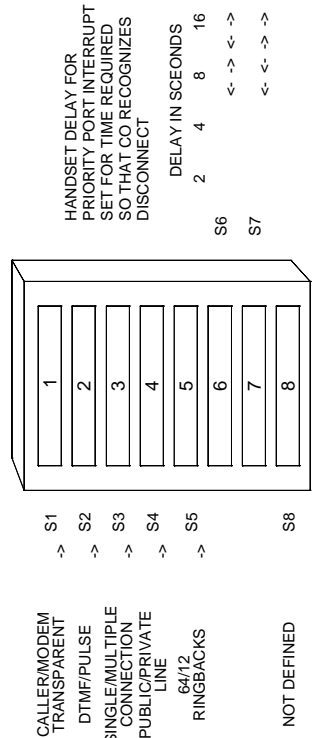
NOTE: FOR LEDS IDENTIFICATION SEE COVER PLATE

POWER SUPPLY TEST POINTS:
 TP1-7: +12VDC REGULATED
 TP2-7: -12VDC REGULATED
 TP3-4: POSITIVE LOAD CURRENT 1V=1A
 TP5-6: NEGATIVE LOAD CURRENT 1V=1A
 TP7: SHELF DC COMMON

REAR VIEW G-8820A/B PABX



G-8820 SWITCH SETTINGS



G-8820B POWER SUPPLY OPTIONS

G-7800C-F SERIES POWER SUPPLIES

- G-7836C-F 12-28 DC-DC Power Supply
(21-28 Vdc to +/-12 Vdc and +/-28 Vdc at 0.5 A)
- G-7838C-F 12-28 DC-DC Power Supply
(42-54 Vdc to +/-12 Vdc and +/-28 Vdc at 0.5 A)
- G-7840C-F 12-28 DC-DC Power Supply
(105-144 Vdc to +/-12 Vdc and +/-28 Vdc at 0.5 A)

GENERAL DESCRIPTION

The Series G-7800C-F 12-28 DC-DC Converter Type Power Supplies are designed to operate from station batteries and provide Da-Tel's data transmission, voice and telemetry equipment with an isolated and regulated power source.

The transformer, T1, has a deltamax core and is connected to a switching-type oscillator circuit consisting of transistors Q1 and Q2. The frequency of the oscillation varies between 400 Hz and 600 Hz over the input operating range and voltage. The resistor and capacitor values of the oscillator components change with the input voltage ratings.

SPECIFICATIONS

Temperature Range: -20°C to +60°C at 1/2 load.

Power Input: 40 watts, maximum.

Power Output Maximum: +/-12 Vdc, +/-5% at 0.5 A.
+/-28 unregulated Vdc at 0.1 A.

Regulation to Line: +/-15% line change causes less than 1% change, either loaded or unloaded.

Ripple: Less than .002 volts.

Size and Weight: Requires 2" of space in card shelf.
Weight is 2.1 pounds. G-7800C-F modules require 1 1/2" of space in standard Da-Tel shelves.

Hipot: 1500 Vrms, 60 Hz between power source inputs and dc outputs.

G-8700F AC-DC POWER SUPPLY

GENERAL DESCRIPTION

The G-8700F AC-DC Power Supply features a +/-0.4 ampere continuous output, current measurement resistors, front panel LEDs to monitor each side of the supply output, standby battery connections, adjustable voltage outputs on the front panel and a loss-of-dc-supply output relay.

The outputs are adjustable from 5 to 15 volts by a front panel potentiometer. Unregulated dc voltage outputs are also provided at the edge connector. The input can be powered from either a 115 Vac or 230 Vac source.

SPECIFICATIONS

Power Input: 115 Vac or 230 Vac, 60 Hz, 30 watts, maximum.

Regulation to Line: +/-10% line change causes less than +/-1% change in output either loaded or unloaded.

Ripple: less than 10 mV, either loaded or unloaded.

Power Output Maximum: +/-12 Vdc, +/-5%, at 0.4 A.
+/-28 Vdc, unregulated, at 0.1 A.

G-8820B

POWER SUPPLY

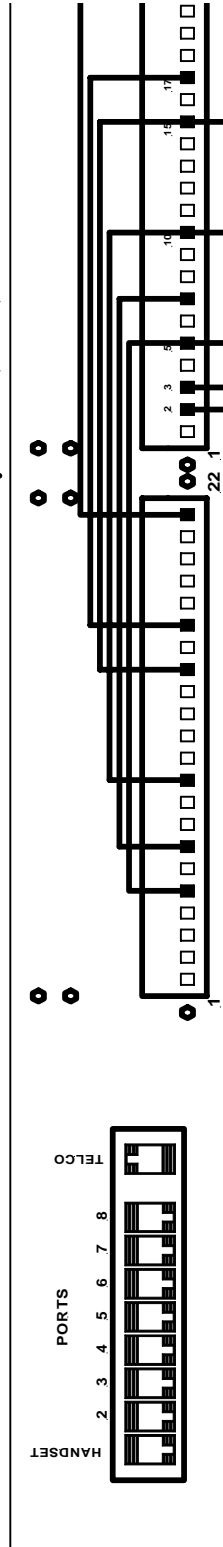
MODEL
 G-7840C-F-12
 G-7838C-F-12
 G-7838C-F-12
 G-7838C-F-12
 G-5700F

#28VDC UNREGULATED OUTPUT
 #12VDC REGULATED OUTPUT

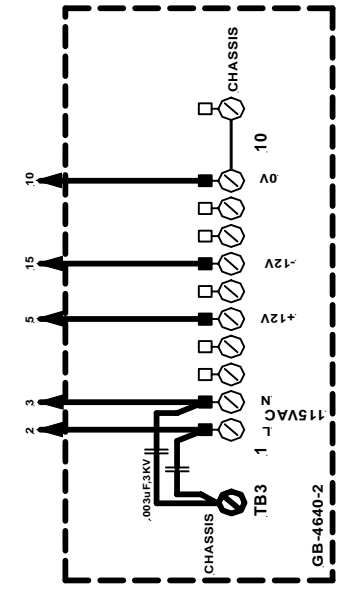
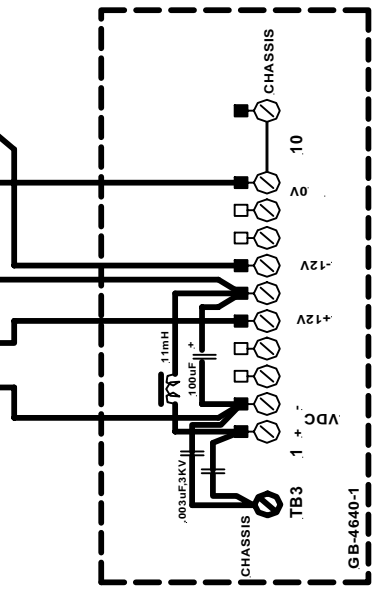
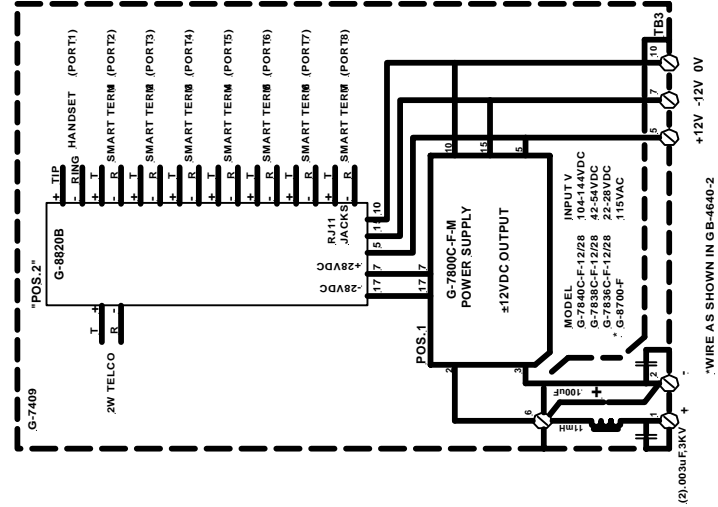
1

2

SERIAL: "XXXXX"



MODIFIED G-7409 19" FLAT RACK



(3) .003uF 50KV

INSTALLATION INSTRUCTIONS

This information is a description of the steps required to place the G-8820B PABX System in service. Refer to the block diagram on page 7 of this Instruction Information booklet for an overview of the system connections.

Power Connections:

The station battery potential is connected to the terminal block TB3, terminals 1 and 2 on the rear of the shelf. Screw terminal #1 is positive (or L for AC operation) and screw terminal #2 is negative (or N). Screw terminal #10 must be connected to the station ground.

Module Installation:

The system requires a power supply, either a G-7800F-12/28 series DC-DC supply or G-8700F AC-DC supply. The shelf number indicates if the unit is wired for DC (GB-4640-1) or AC (GB-4640-2) operation. A quick check visually behind TB3 will show an inductor and electrolytic capacitor if the shelf is wired for DC operation. When viewing the front of the shelf the power supply is located to the far left in the position labeled 'PS'.

Initially a number of option switches need to be set on the G-8820B main pcb. The options available and the corresponding switch settings are detailed in the Instruction Information for the G-8820B PABX System. This should be completed before telephone line and device connections are made.

Telephone Line Connection:

The incoming telephone line, terminated with an RJ11 plug, is inserted in the RJ11 receptacle labeled TELCO at the rear of the shelf.

Station Handset Connection:

The station handset is connected to the RJ11 receptacle labeled HANDSET. This is port 1. This port has priority over the remaining ports and can disrupt ongoing data communications in emergencies if taken off-hook. If the shelf power is off or other failure occurs the port 1 handset will be directly connected to the incoming telephone line.

Modem Connections:

The remaining RJ11 receptacles labeled 2 - 8 are for the FCC registered devices. These ports are free to be used as required for modems.

Power-Up Procedure:

The first step in commissioning a station is to check the handset. With the power off it should be fully func-

tional. A dial tone should be heard when the handset is picked up. Place a call and speak with someone at a remote location. Conclude the call and hang-up.

Turn the power supply on from the front panel switch. Immediately, the indication of power on and G-8820B ON should illuminate. The supply measurements should be checked as follows:

TP1-7 +12 Vdc	TP3-4 <200 mVdc	TP4-7 >+25 Vdc
TP2-7 -12Vdc	TP6-5 <210 mVdc	TP6-7 <-25 Vdc

Test points (TP) 1 and 2, with reference to TP7, are the operating potentials for the shelf. Test points 3-4, in millivolts, relate to the positive supply load in milliamperes. Test points 5-6 relate to the negative supply load. These are typical load figures for the G-8820B 8 audio port system.

The following operational checks need to be run.

1. Take the local handset off-hook. OFFHOOK and HANDSET LEDs should illuminate.

The supply measurements should be as follows:

TP3-4 <275 mVdc	TP6-5 <120 mVdc
--------------------	--------------------

2. Place a call and speak with someone, ask them to call you and hang-up (the OFFHOOK and HANDSET LEDs go off).

3. The incoming call lights the RING INDICATION LED. The OFFHOOK LED lights next. Wait for the steering window delay to elapse. The HANDSET LED lights as the handset is rung.

Pick up the handset. This causes the HANDSET LED to light. Talk to the calling party and note signal quality. Poor signal quality will impact the following testing. Have the calling party send a steady tone (DTMF) and ensure that the signal level at TP2-7 is at least -30 dBm. If a modem is to generate the steering tones, ensure that its level is at least -30 dBm, also. Below this level the DTMF detector will not function to redirect the call. R10, accessible from behind the front panel, may be used to increase the incoming signal gain to the DTMF decoder if required.

Operational Notes:

As a simple audio test, step three can be repeated as the handset is moved from one port to the next. Be sure to tell the calling party to which port the next call should be redirected.

Further testing of the system requires that a laptop PC equipped with a modem be available. In this case the

ports dedicated to modems would be individually checked. Someone outside the station is required to dial in, redirect the call to the port under test, establish communications and pass a test data file.

For either voice testing with a handset or data testing with a laptop, the ports should also be tested by placing outgoing calls.

The priority port feature should be checked during an outgoing call. Do this by picking up the handset of the telephone on port 1 while data is being passed on another port. Stay off-hook until a dial-tone is heard in the earpiece, then place a call.

FCC REGULATIONS

FCC RULES AND REGULATION, PART 68

The G-8820B PABX complies with Part 68, FCC Rules. The FCC registration number is 1DF2MS-60420-TF-T. Ringer equivalence is 1.0 B. All equipment connected to ports 1 through 8 must be FCC registered and must comply with Part 68.

Notify the telephone company as soon as you have installed the G-8820B PABX. Give your service representative the above registration number and ringer equivalence. You are required to do this or you can lose your telephone service.

FCC REQUIREMENTS FOR CONSUMER PRODUCTS

This equipment complies with Part 68 of the FCC Rules. On the center rear panel of this equipment, adjacent to the telephone line connector, is a label that contains, among other information, the FCC registration number and ringer equivalence (REN), 1.0B, for this equipment. If requested, provide this information to your telephone company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most, but not all areas, the sum of the RENs of all devices should not exceed five (5.0B). To be certain of the number of devices you may connect to your line, as

determined by the REN, you should call your local telephone company to determine the maximum REN for your calling area.

If the G-8820B PABX causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if an advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

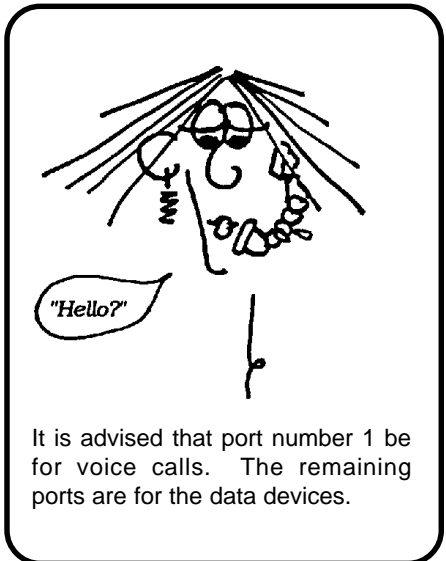
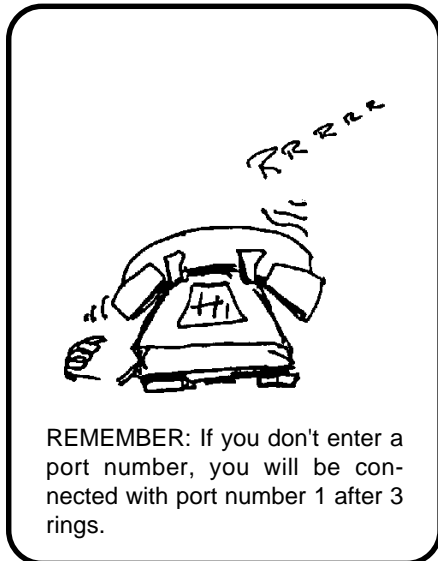
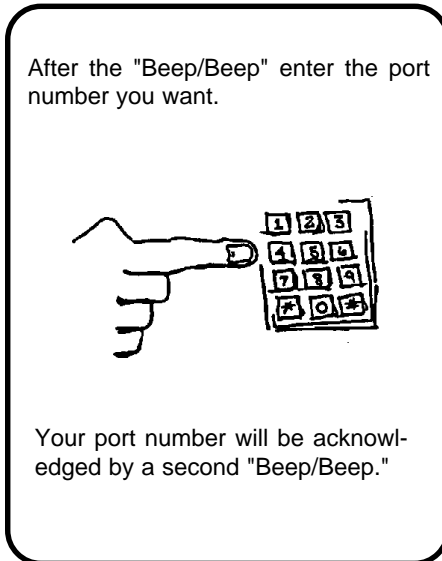
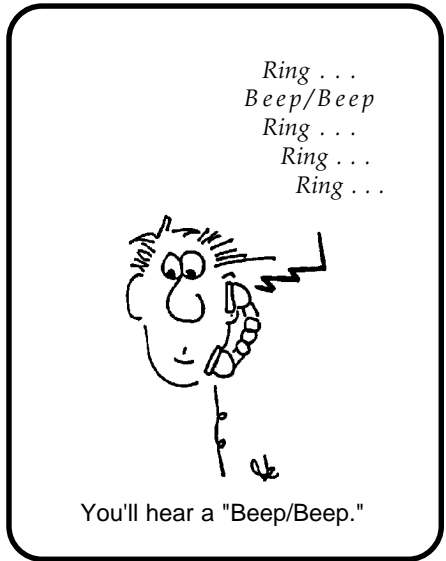
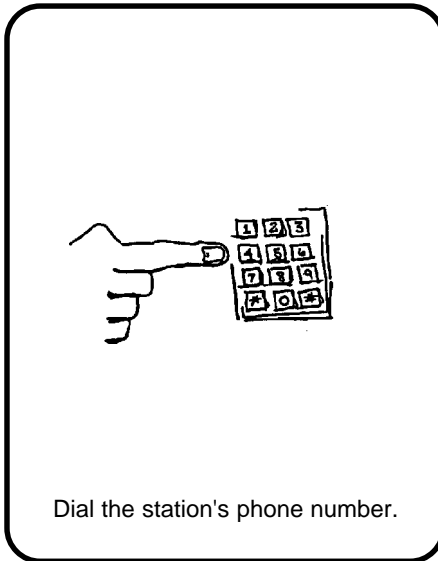
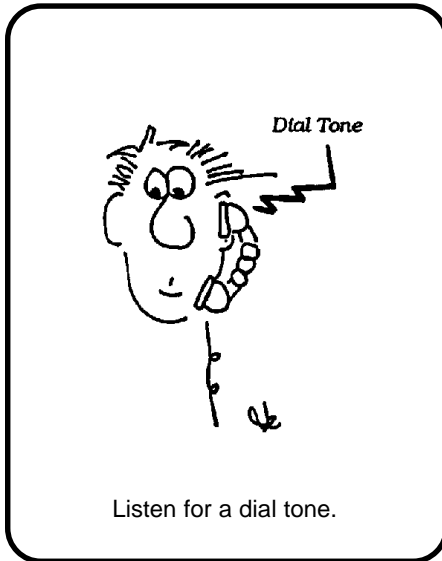
Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

If you experience trouble with the G-8820B PABX, please contact Da-Tel Research Company, Inc. at 1-800-324-8388 or (970) 249-6129. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected or you are sure that the equipment is not malfunctioning.

Contact the manufacturer at the above number for repair information.

This equipment may not be used on coin service provided by the telephone company. Its connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.

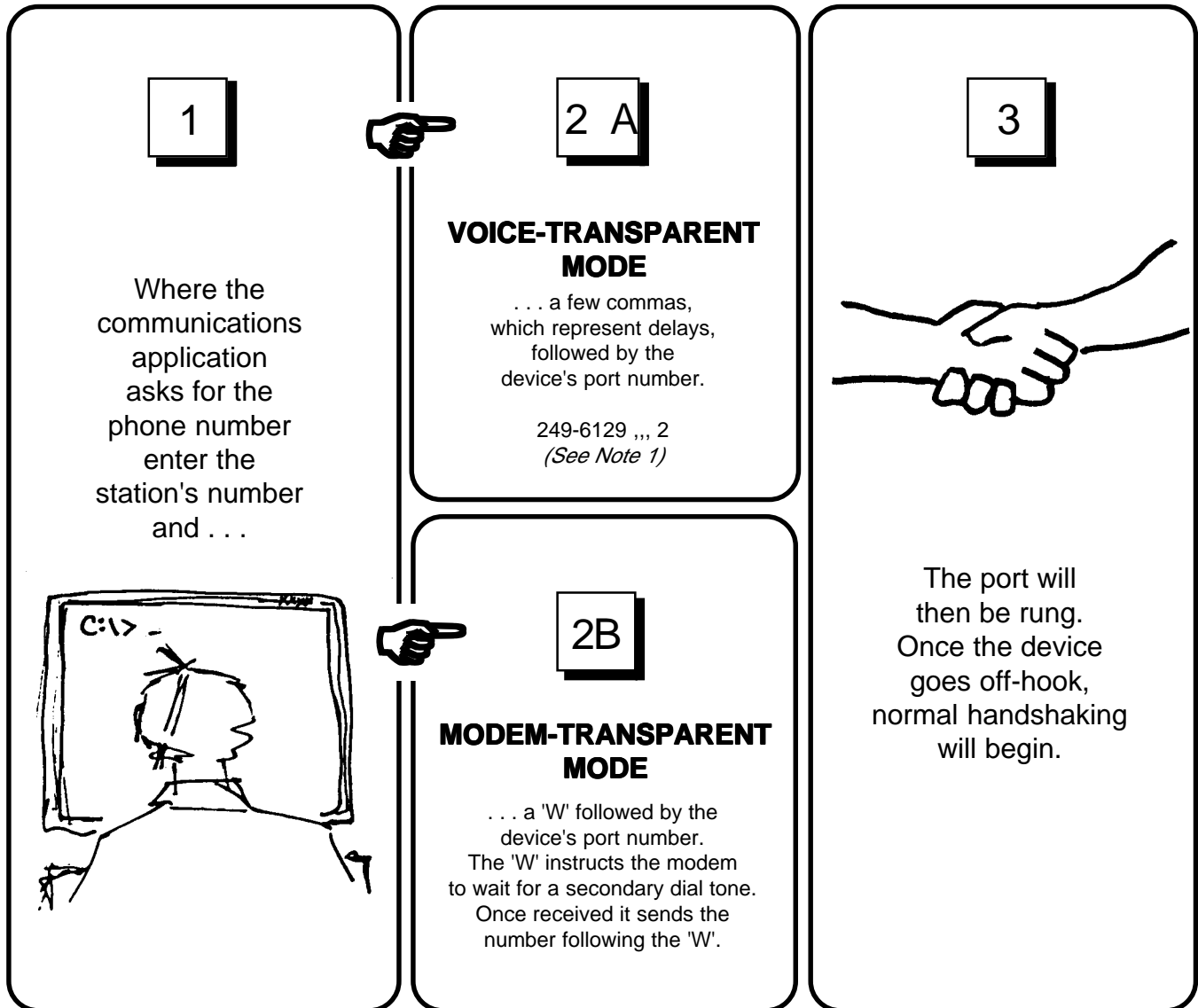
VOICE CALLS



NOTES

1. If you hear a ring and then a dial tone, stay on the line for 5 seconds or press '1'. The line switch is in the modem-transparent mode.
2. If you want to hang up before a port goes off-hook, please press '#'.
3. You can redirect a call by dialing another port anytime before a port goes off-hook.
4. To jump past the initial delay and ring the handset immediately, press '1' after hearing the "Beep/Beep".
5. The initial delay allows time for calls to be redirected to one of the alternate ports without disturbing local personnel.

DATA CALLS



NOTES

1. The commas instruct a Hayes compatible modem to delay 1/4 of a second. The number of commas needed depends on the time to make a connection. If procedure 2A fails, then try a shotgun approach: ',02,02,02,02'.
2. The level of the secondary dial tone as received must typically be above -32 dBm for your modem to recognize it. If too low, try Note 1.

REPLACEABLE PARTS

		R1, 2, 3, 6, 7, 8, 9, 20, 21, 22, 23, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41	Resistor, Composition; 1/4W, 5%.
C1, 12	Capacitor, Mylar; .47 uF, 200 V, MMWA2P47, Cornell-Dubilier.	R10	Resistor, Composition; 1/2W, 10%.
C2	Capacitor, Tantalum; 10 uF, 50 V, 150D106X9050R2, Sprague.	R11, 12	Potentiometer, Linear; 10K, 64Y103, Spectrol.
C3, 16	Capacitor, Tantalum; .1 uF, 35 V, 150D104X9035A2, Sprague.	R13	Resistor, Wire Wound; 3.9K ohm, 3W, VC3D, Clarostat.
C4, 17	Capacitor, Ceramic; .05 uF, 16 V, UK16-503, Centralab.	R4, 5, 14, 15, 16, 17, 18, 19, 25, 27, 43, 44	Resistor, Precision; 1/8W, 1%.
C5, 6	Capacitor, Electrolytic; 150 uF, 16 V, TE-1163, Sprague.	R42	Resistor, Wire Wound; 20 ohm, 3W, VC3D, Clarostat.
C7, 13	Capacitor, Tantalum; 4.7 uF, 10 V, 150D475X9010A2, Sprague.	RN1, 2, 3, 4, 5	Resistor Network; 10K ohm, Isolated, 4308R-102-103, Bourns.
C8, 9	Capacitor, Tantalum; 22 uF, 15 V, 150D226X9015B2, Sprague.	RN6	Resistor Network; 10K ohm, bus, 4306R-101-103, Bourns.
C10, 11	Capacitor, Mylar; .047 uF, 200 V, MMWA2S47, Cornell-Dubilier.	S1	Switch; ADP-04, Alcoswitch.
C14	Capacitor, Ceramic; .01 uF, 100 V, TGS-10, Sprague.	T1	Transformer; TH5114, Microtran.
C15	Capacitor, Tantalum; 6.8 uF, 35 V, 150D685X9035B2, Sprague.	T2	Transformer; LB12230, Stancor.
CR1	Diode, Zener; 1N5226A.	T3	Transformer; TTPC-13, Stancor.
CR2, 3, 4, 5, 7, 8, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	Diode; 1N4148.	U1	Quad Exclusive "NOR" Gate; MC14070BCP, Motorola.
CR6, 33, 34	Diode, Zener; 1N5349B.	U2, 3	Quad 2-Input AND Gate; MC14081BCP, Motorola.
CR9, 10, 11, 12, 27, 28, 29, 30, 31, 32	LED, Red; 550-0406, Dialight.	U4, 5, 12, 15	Inverting Hex Buffer; MC14049UBCP, Motorola.
K1 (CTO Relay)	Relay, Reed; MRR1CDL, 12 Vdc, Struthers-Dunn.	U6	Triple 3-Input NOR Gate; MC14025BCP, Motorola.
K2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 (CT and RT Relays)	Relay, Reed; MRR2ADLX, 12 Vdc, Struthers-Dunn.	U7	Ring Detector; TCM1520A, Texas Instruments.
K14	Relay; NB1E-DC12V, Aromat.	U8, 14, 18, 19, 20, 21, 22, 23	Optoisolator; 4N35, Motorola.
Q1	Transistor; 2N4921.	U9	DTMF Integrated Receiver; G8870DI, GTE.
Q2, 3	Transistor; 2N3585.	U10, 13	12-Bit Binary Counter; MC14040BCP, Motorola.
Q4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	Transistor; 2N3903.	U11	Dual Op-Amp; TL082IP, Texas Instruments.
		U16	8-Bit EPROM Microcontroller Unit; MC68705R3S, Motorola.
		U17	Op-Amp; TL081IP, Texas Instruments.
		U24	Voltage Regulator; MC7805CT, Motorola.
		X1	Crystal; C1600N, NEL Frequency Control.

CAUTION ALERT!

FOR G-8820B, G-9020, G-9030 AND G-9420 GROUNDING AND PORT TELEPHONE CABLE ROUTING PROBLEMS

The loss of an output is caused by exceeding the surge rating of the module (IEEE C37.90.1-1989). This excessive transient can be traced to 1 or 2 causes.

1. Lack of proper grounding or inadequate ground.

If you are experiencing a problem ensure the unit is properly connected to station ground. On the G-8820, TB3, terminal 10 should be connected to ground; on the G-9020, TB11, terminal 10 should be connected to ground; on the G-9030, TB1, terminal 3 should be connected to ground; and on the G-9420, TB1, terminal 3 should be connected to ground. Relying on the physical mounting for a ground is a gamble. Provide solid grounding.

2. Routing of port telephone cables in the substation.

The routing of the telephone cable to the Intelligent Electronic Device (IED) may be problematic. Routing the cable in ducts with high voltage cables can produce transients. Try rerouting the cable paying attention to its companion cables.

3. Finally . . .

On lines that remain problematic, try a CITELE B180T line protector. Customers who have used this CITELE module have increased the reliability of their equipment. You can reach CITELE at 1-800-248-3548.

If you have any questions or comments please call Rick Smith at (970) 249-6129 or (800)324-8388.
Thank you.