AMERICAN TELECOMMUNICATIONS CORPORATIONS

MODEL 205 *TonePulse** CONVERTER

STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section is a cover sheet for the American Telecommunications Corporation (ATC) TonePulse Converter Model 205 instruction, Section 202420. GAEL 1660-2 authorizes the use of this equipment in Pacific Company.

1.02 It is reissued to remove ordering procedures for the ATC TonePulse Converter. GAEL 1660-3 rerates the Model 205 converter as not standard for new purchases in step-by-step (SXS) offices. All future orders for the SXS converter are to be placed for the new standard converter described in GAEL 1925 and Section 227-625-903PT.

Notes:

1. Existing ATC converters can be removed and reapplied in other SXS offices as needs dictate as stated in GAEL 1660-3.

2. Marginal arrows used to designate changes are omitted.

1.03 The ATC Model 205 is a direct replacement for the ATC Model 204.

1.04 The Model 205 is a solid-state device which is used to convert *Touch-Tone®* signals to dial pulse and can be used in combination rotary dial or *Touch-Tone* groups. The unit is designed for SXS or No. 1 crossbar offices. The model is used on a 1- or 2-party line, with or without ANI, or coin lines.

1.05 The unit is installed in the tip (T) and ring (R) path between the line finder and its first selector on a one-for-one basis.

1.06 Due to the effects that nonprecise dial tone may have on the converter, it is necessary to limit their installation to offices equipped with precise dial tone.

Note: In SXS offices, it should be noted that if *Touch-Tone* subscribers wish end-to-end signaling, a polarity guard kit must be installed in the subscriber's *Touch-Tone* set. (Refer to Section 501-321-100.)

1.07 If corrections are required in the manufacturer's instruction, use Form E 3973-1PT as described in Section 000-010-901PT to process the correct information.

1.08 If equipment design and/or manufacturing problems should occur, refer to Section 010-700-011PT for procedures on how to file an Engineering Complaint for General Trade Products.

1.09 When revised instructions reflect changes due to modification of equipment, retain superseded information until equipment is modified.

Note: Equipment *shall not* be modified without the approval of the Equipment Maintenance Engineer.

2. TRAINING

2.01 Minimal training is required as no repair work will be performed on the converter by Telephone Company (TELCo) maintenance force.

**Trademark of American Telecommunications Corporation*

NOTICE
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Bell System except under written agreement

Printed in U.S.A.

3. MAINTENANCE

3.01 Field repairs that involve replacements or modifications of components within this unit are not recommended.

3.02 If the seals on a returned unit are broken, the warranty could be rendered null and void.

3.03 For those units out of warranty, ATC could (at their discretion) refuse to perform any requested work on these units.

4. TEST PROCEDURES

4.01 Acceptance tests for the TonePulse converter are covered in Section 227-625-900PT, Appendix 1.

4.02 Until a suitable test set is made available for testing in SXS, a CMC *Trub-L-Shooter** hand-set may be used for testing the TonePulse converters. To obtain this test set, use a Form CE-1005 (Request for Individual Use of Non-Standard Item) for each test set ordered.

Note: This is an interim arrangement only and in no way does it imply standardization of the CMC Trub-L-Shooter handset.

5. WARRANTY

5.01 The ATC warranty remains in effect for all units that have been purchased. Units purchased prior to February 1, 1978, carry a 3 year warranty from the date of shipment. Those units purchased after February 1, 1978 carry a 5 year warranty.

5.02 All repaired/modified units will remain under warranty for the duration of the original warranty period or for a 90-day period after date of repair/modification, whichever is longer.

6. REPAIR/RETURN

Notes:

1. Northern Region will comply with local procedures when returning items for repair.

2. Southern Region will comply with the procedures contained in this section when returning items for repair.

6.01 ATC provides a factory repair and/or modification service for the converter. A return authorization must be obtained from ATC (call 213+ 579-1710).

6.02 ATC will send a packaging label to affix to the package. This label lists the address where the unit is to be shipped for repair and/or modification.

6.03 A GTP 2161, Return Material Tag, *must* be attached to the unit prior to shipping to ATC.

7. EXCLUSIONS/REVISIONS

7.01 The following changes apply to the manufacturer's instruction (Section 202420):

- **Part 8.0 REPAIR AND WARRANTY — deleted**

  Note: This part is not applicable to Pacific Company. Repair and warranty information is covered in detail in Part 5 and GAEL 1660-2.

**Trademark of Communication Manufacturing Company*

Attachment:

American Telecommunications Corporation, TonePulse Converter Model 205, Section 202420, Issue 3, September 1977

TonePulse™ Converter Model 205

DESCRIPTION, FUNCTIONAL DESCRIPTION, SPECIFICATIONS, ORDERING INFORMATION, INSTALLATION, TESTING

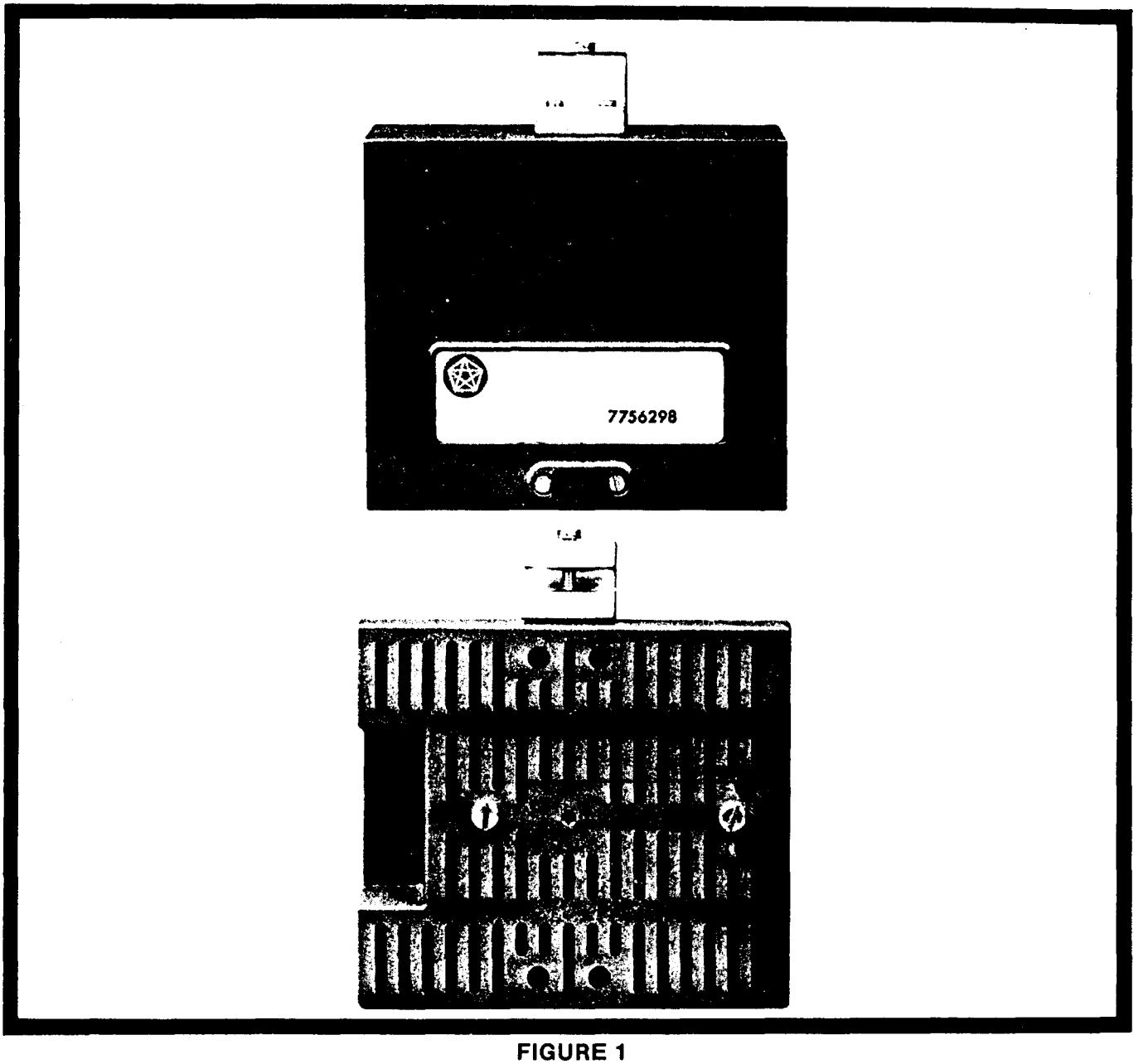
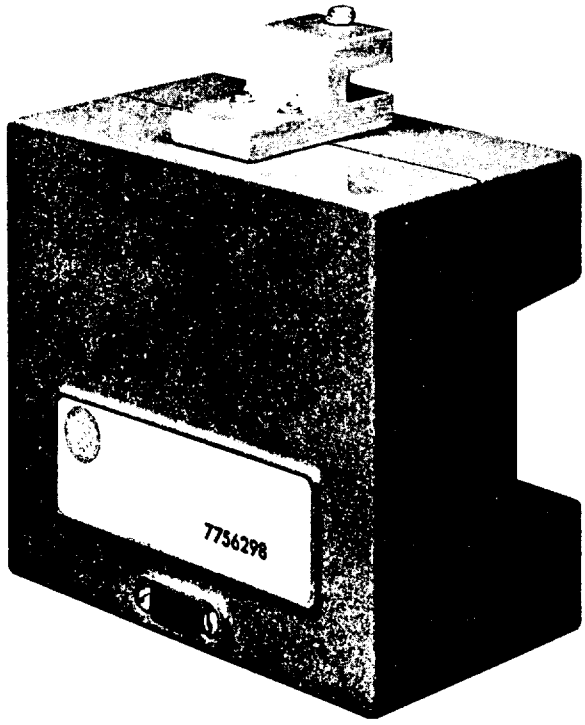


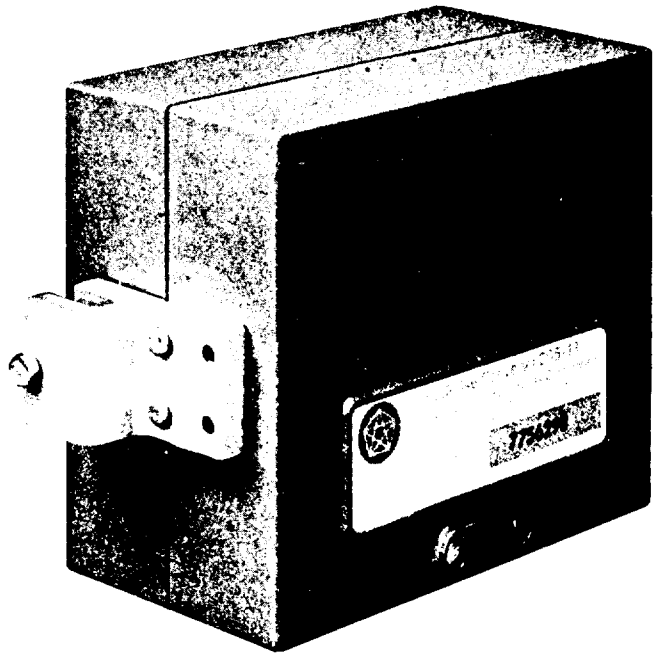
FIGURE 1

CONTENTS **PAGE**

TonePulse™ Converter Model 205



MODEL 205
CONVERTER WITH TOP-MOUNTED BRACKET



MODEL 205
CONVERTER WITH SIDE-MOUNTED BRACKET

FIGURE 2

1.0 GENERAL

This Standard Practice provides a Description, Functional Description, Specifications, Ordering Information, Installation and Mounting Instructions, and Testing Procedures for American Telecommunications Corporation Model 205 TonePulse Converters.

The 205 family of TonePulse Converters translate Touch-Tones* to rotary pulses. Two models are designed for conversion of #1 Crossbar Central Offices, five others for conversion of Step-by-Step Central Offices.

2.0 DESCRIPTION

2.01 PHYSICAL DIMENSIONS

The Model 205 TonePulse Converter (Figure 2) is a compact, solid-state unit measuring 4.1 inches high by 4.7 inches wide by 2.7 inches deep. In most applications, it can be mounted directly behind a linefinder.

*Touch-Tone is a registered trademark of AT&T.

2.02 CONVERTED DIGITS

For step equipment, the Model 205 Converter is dedicated one per linefinder. For #1 Crossbar Offices, one unit is associated with each subscriber sender. In all cases, Touch-Tone digits 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0 are converted to a sequence of break pulses.

2.03 ANSWER SUPERVISION

TonePulse Converters treat a polarity reversal of the outgoing Tip and Ring the same as an On-Hook condition. This feature prevents dial pulse conversion after the called party has answered.

2.04 TIP PARTY IDENTIFICATION

Converters with this feature detect impedance imbalance caused by a Tip Mark resistance of 1000 to 3000 ohms on the subscriber Tip and present either 1000 or 2700 ohms from the outgoing Tip-to-Ground when the line is split.

2.05 20 PPS

Converters used with #1 Crossbar Central Offices are especially equipped with 20 PPS outpulsing. This is to minimize the holding time of the subscriber senders.

2.06 TIME OUT

Converter Models 205-07 and -14 do not have this feature. Models 205-11, -13, and -23 "time out" after 20 seconds. After time out, no further conversion occurs until an On-Hook followed by an Off-Hook is recognized. Models 205-11 and -13 initiate timing after recognition of the On- to Off-Hook transition. Model 205-23 initiates timing after the first digit has outpulsed, preventing time out in the presence of dial tone. Timing for Models 205-11, -13, and -23 is reset by each digit recognized.

2.07 # TURN-OFF

When # is depressed in a sequence of digits, digits prior to # will be converted while those following will not. This mode of signalling is used when processing computer equipment requiring Touch-Tone digits for data or control.

3.0 FUNCTIONAL DESCRIPTION

3.01 POWER CONSUMPTION

Model 205 Converters draw no more than 55 mA during idle and 115 mA when the line is split.

3.02 OFF-HOOK AND ON-HOOK DETECTION

An On-Hook or Off-Hook is recognized by the sensing of current flow in the Tip and Ring. Tip is positive with respect to Ring. Off-Hook is determined by a 20 mA or greater current drain for a period of 400 ms or more. On-Hook is determined by 2 mA or less current for a period of 300 ms or more.

3.03 TOUCH-TONE RECEIVER

Touch-Tone digits sent by the subscriber are capacitively coupled into the input amplifier which is protected from lightning surges. High and low band split-apart filters attenuate all undesired frequencies. Limited high and low filter outputs are analyzed by a crystal-controlled digital receiver.

3.04 ANSWER SUPERVISION DETECTION

A reversal of current flow for 50 ms or longer at 20 mA or more halts conversion.

3.05 LINE SPLITTING

The Model 205 Converter must split the line to allow the unit to receive incoming Touch-Tone digits while previous digits are being outpulsed. Splitting initially occurs at "buttons up" of the first digit, and the line remains split if a Touch-Tone digit is received within 40 milliseconds of the last converted dial pulse.

During the line split condition, the subscriber's Tip and Ring are fed with battery and ground through 370 ohm resistors. On-Hook or Answer Supervision will terminate conversion and restore the line.

3.06 TONE GUARD PROTECTION

After a tone pair has been validated, a 10 ms interruption is allowed to guard against line transients. This minimizes the chance of splitting tones of long duration into more than one digit.

3.07 REGISTER

Since Touch-Tone digits can be generated by subscribers faster than the switching equipment will accept dial pulses, a 16-digit register stores the digits. The first digit input is the first converted.

3.08 SENDER

The sender accesses the digits from the register in order and generates break pulses. Reliable outpulsing is acquired through the use of a transistor switch which applies 330 ohms across the outgoing Tip and Ring.

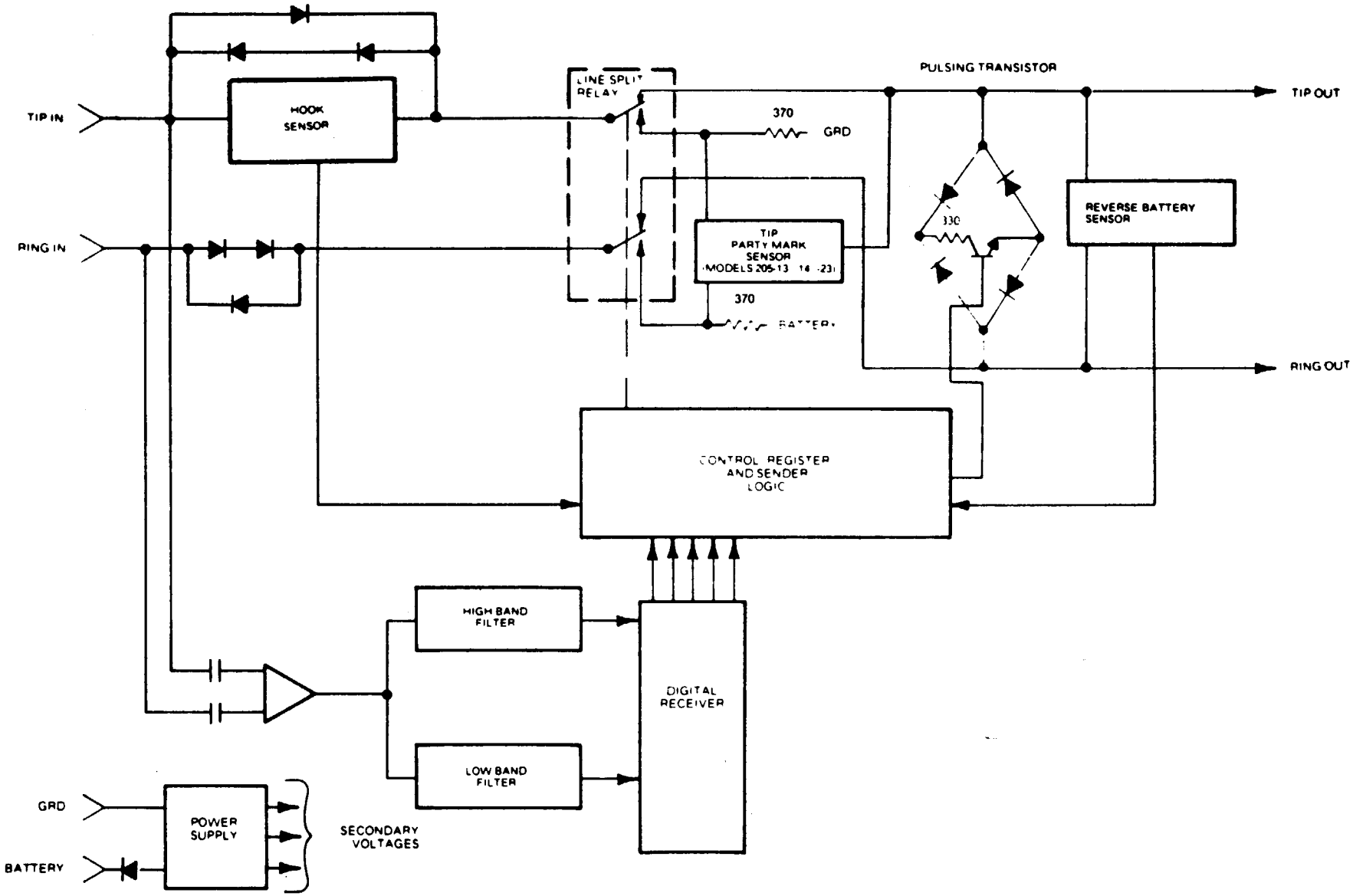


FIGURE 3. FUNCTIONAL SCHEMATIC

4.0 SPECIFICATIONS

PARAMETER	MINIMUM	MAXIMUM	QUALIFICATION
Input Impedance	40KΩ		Tone Receiver, AC Bridging
Tone Amplitude	-20 dBm	+ 6dBm	Per Frequency
Frequency Deviation		± 1.5%	
Twist		+ 4db -8db	Relative amplitude of high band frequency referenced to low band frequency
Skew		3.0%	Absolute Value of Difference In Frequency Deviation
Tone Duration	40ms		Tone Cycle Time is 80 ms Minimum
Intertone Duration	40ms		
Tone to White Noise Ratio		20dB	
Digit Storage Capacity		16	
Outpulsing Rate	9.9 pps	10.1 pps	
	20.0 pps	21.0 pps	Models 205-07, 14
% Break	58%	62%	
	60%	64%	Models 205-07, -14
Interdigital Time	677 ms	683 ms	
	322 ms	328 ms	Models 205-07, -14
Insertion Loss		0.5 dB	
Late Line Split			Buttons Up
Time to Unsplit		40 ms	After last Converted Pulse
		50 ms	After Battery Reversal
		300 ms	After On Hook

PARAMETER		MINIMUM	MAXIMUM	QUALIFICATION
Time Out		19 sec	21 sec	See paragraph 2.06
Identifiable Tip Mark		1KΩ	3.0KΩ	
Repeated Tip Mark		900Ω	1.1KΩ	Model 205-14
		2.6KΩ	2.8KΩ	Models 205-13, -23
Battery		-44 Vdc	-56 Vdc	
Current	Idle		55 MA	
	Pulsing		115 MA	
Off Hook Recognition		200 ms	400 ms	
			50 ms	Models 205-07, -14
On Hook Recognition		150 ms	300 ms	
Answer Supervision		30 ms	50 ms	Tip and Ring Polarity Reversal
Fusing		½ Ampere		Linefiner fusing is adequate
Storage Temperature		-55°C	85°C	
Operating Temperature		0°C	55°C	

5.0 ORDERING INFORMATION

Ordering Model 205 TonePulse Converter equipment requires selecting the desired option configuration and its associated cables and mounting hardware. (See Table 1, 2, and 3.)

TABLE I
TONEPULSE CONVERTER MODEL DESIGNATIONS

Part No.	Application	Model No.	Voltage 48V	Speed (PPS)		ANI (Repeated Tip Mark)		Time Out		
				10	20	2.7KΩ	1KΩ	None	20 Sec.	20 Sec. After First Digit
202300-1	#1 Crossbar CO	205-07	X		X			X		
202300-2	CO	205-11	X	X					X	
202300-3	GTE CO	205-11	X	X					X	
202300-4	GTE CO	205-13	X	X		X			X	
202300-5	CO	205-13	X	X		X			X	
202300-6	#1 Crossbar CO	205-14	X		X		X	X		
202300-7	GTE CO	205-23	X	X		X				X
202300-8	CO	205-23	X	X		X				X

TABLE II
BRACKETS AND MOUNTING HARDWARE

TYPE	PART NO.
Vertical	100114-3
Extender	100114-4
Long/Short Throat	201915-2*
Boxed Angle	201036
Converter Mounting Bracket	200977
Mounting Frame Assembly	100339
Crossbar Adapter	201067

*Furnished with all converters unless otherwise specified.

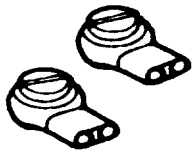
TABLE III
CABLES AND ACCESSORIES

TYPE	LENGTH	PART NUMBERS
6-Pin Cable	*18''	100342-4
	**24''	100342-8
	48''	100342-5
	72''	100342-9
Splice Connectors	***	721006-1
Converter Connector Plug		100319-9
Polarity Guard		201171-1

*Furnished with Model 205-11 and 205-13 Converters unless otherwise specified.

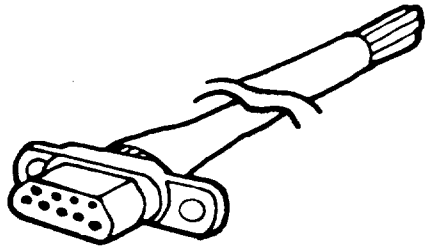
**Furnished with Model 205-07, 205-14 and 205-23 except GTE Converters unless otherwise specified.

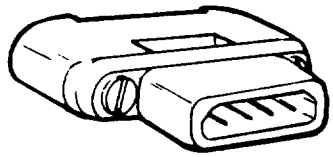
***Two furnished with every cable.



721006-1
SPLICE CONNECTORS

*100342-4, -5, -8, -9
CABLE





100319-9
CONVERTER CONNECTOR PLUG

Used to provide circuit continuity when converter cables are to be installed prior to the converters.

(*) Each Cable includes two splice connectors.

FIGURE 4
CABLE AND PLUG ACCESSORIES

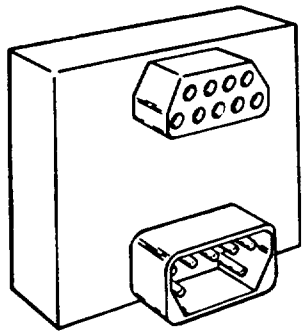
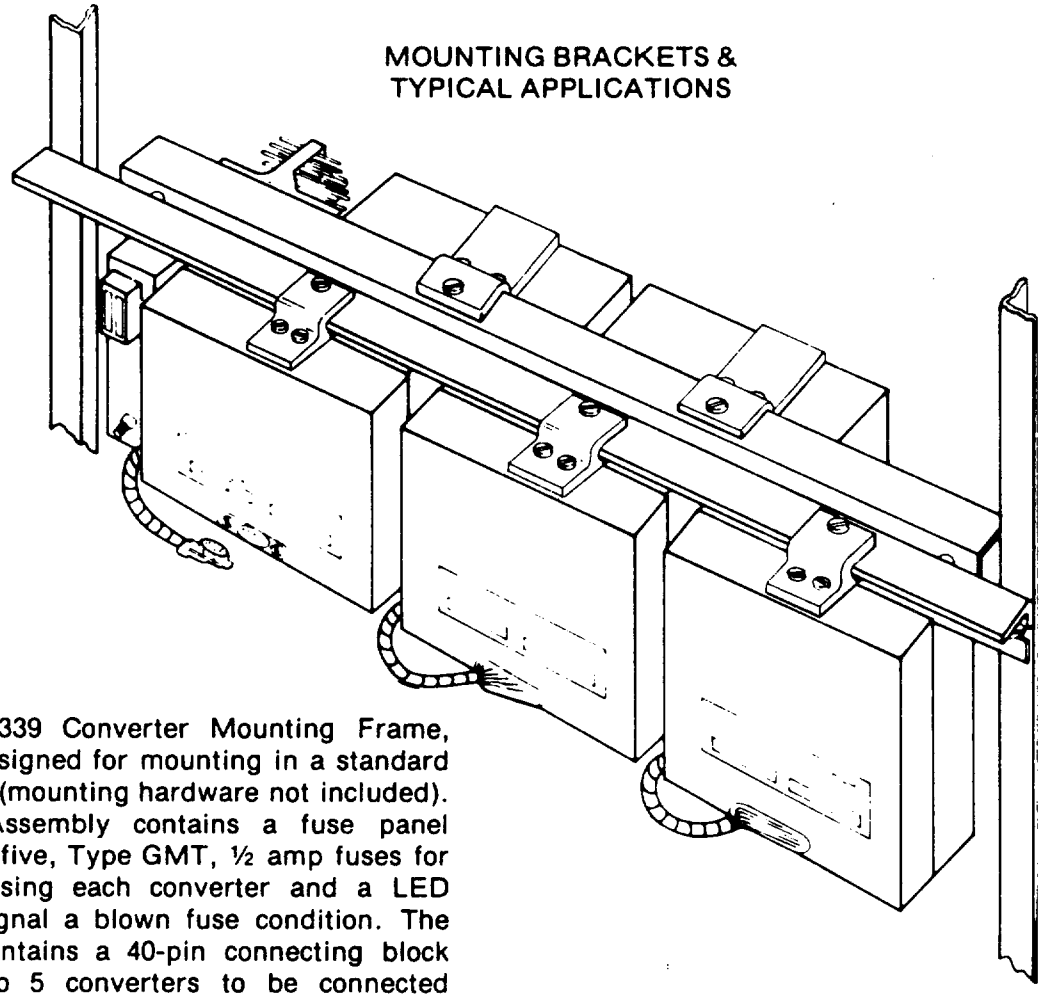


FIGURE 5
POLARITY GUARD

201171-1 POLARITY GUARD

This accessory is recommended for use with converters serving Touch-Tone subscribers without polarity guarded telephones. Polarity guards are required for subscribers who signal computers. The polarity guard is compatible with all converter cables and is installed between the converter and its cable.

MOUNTING BRACKETS &
TYPICAL APPLICATIONS

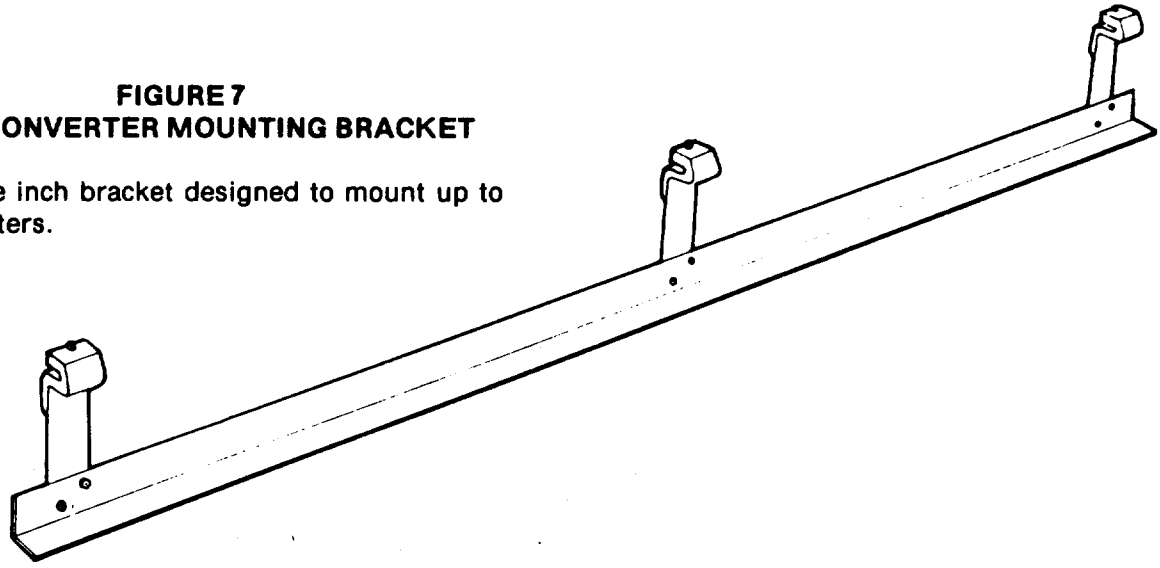


The ATC 100339 Converter Mounting Frame, Figure 6, is designed for mounting in a standard 19'' relay rack (mounting hardware not included). The Frame Assembly contains a fuse panel equipped with five, Type GMT, ½ amp fuses for individually fusing each converter and a LED indicator to signal a blown fuse condition. The Frame also contains a 40-pin connecting block allowing up to 5 converters to be connected between a linefinder and first selector.

FIGURE 6
100339 MOUNTING FRAME ASSEMBLY

FIGURE 7
200977 CONVERTER MOUNTING BRACKET

A forty-one inch bracket designed to mount up to ten converters.



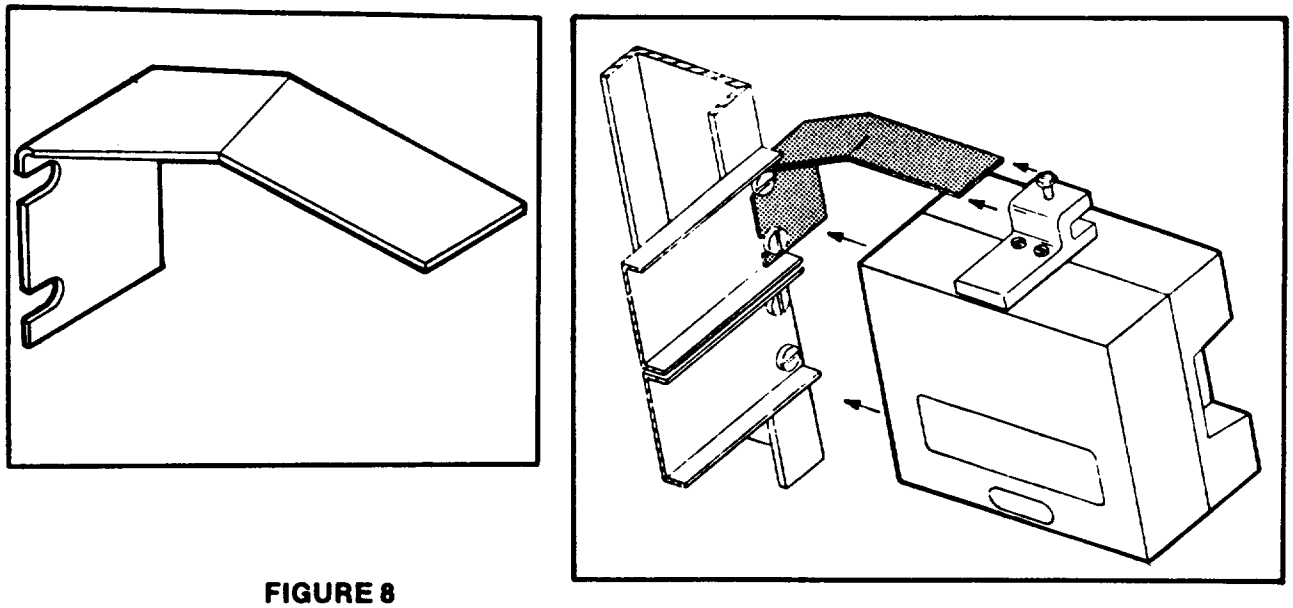
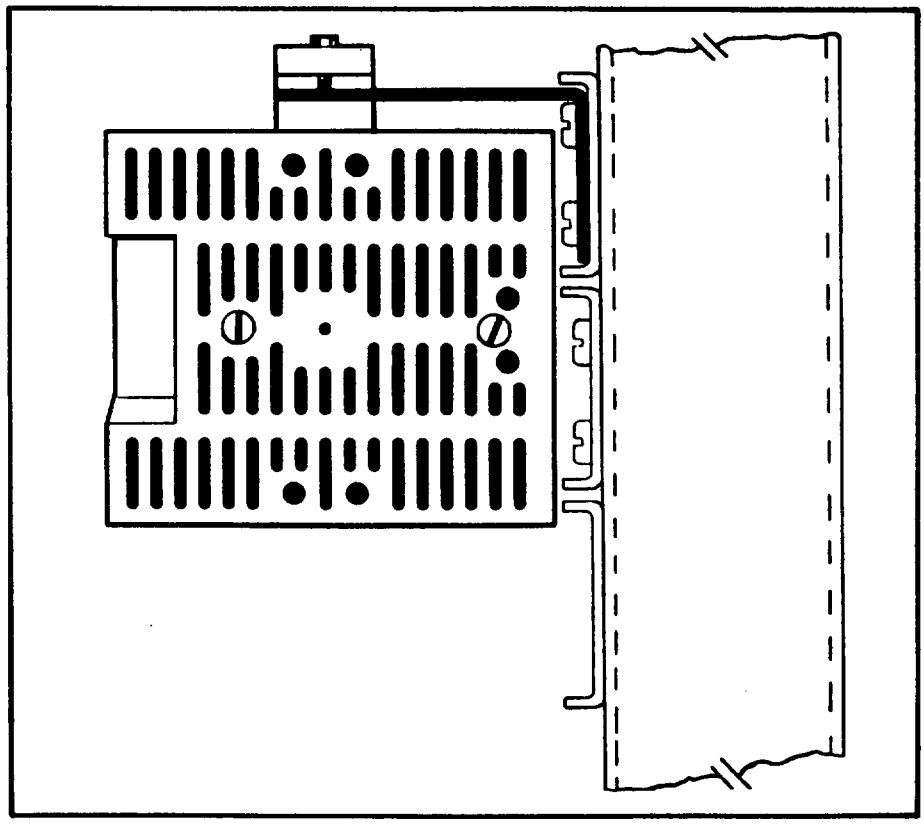
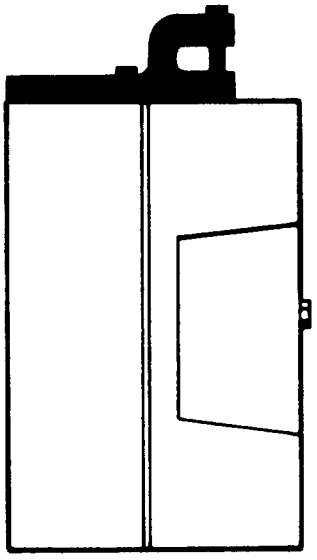


FIGURE 8
201067 CROSSBAR ADAPTER

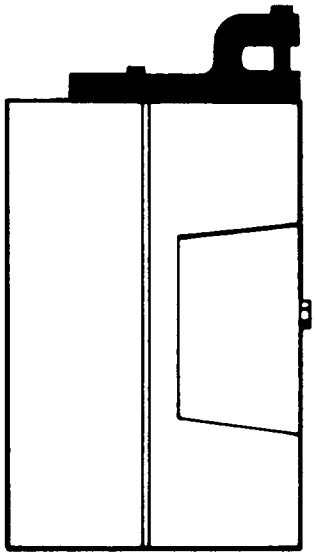
This bracket is required for Converter mounting in #1 Crossbar Offices. This bracket must be used in conjunction with one of the other brackets.



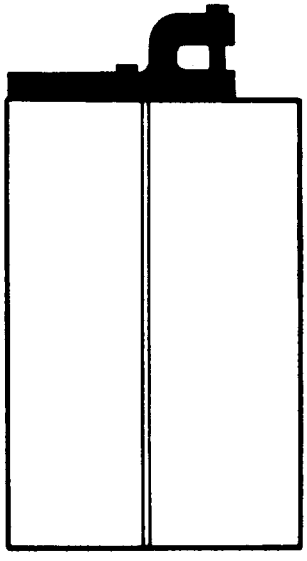
MOUNTING CONFIGURATIONS
P/N 201915-2 LONG/SHORT THROAT



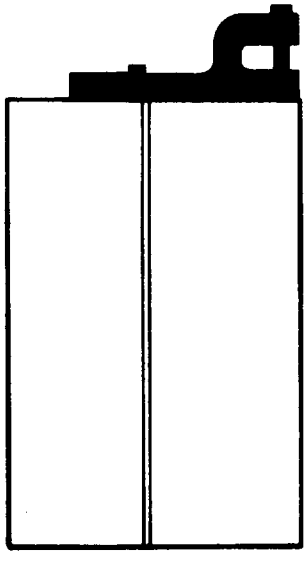
A typical mounting behind a linefinder is shown here. This configuration is used where there are no wires, components or other protrusions extending beyond the channel.



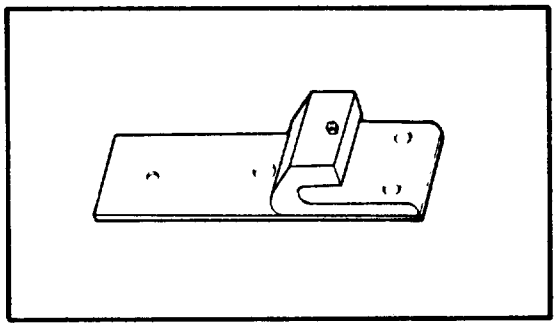
This mounting configuration is used when components or other protrusions occur up to 0.75 inches beyond the channel.

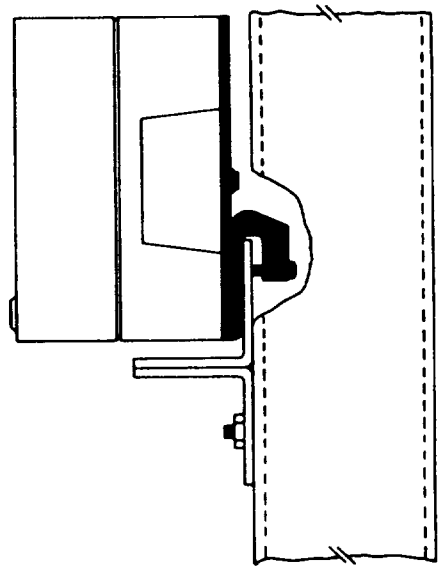


This configuration of side mounting allows 10 converters to fit in the same space as would 9 converters mounted in upright position. The converter in this position has a width of 4.1 inches as opposed to 4.7 inches when mounted in the upright position.



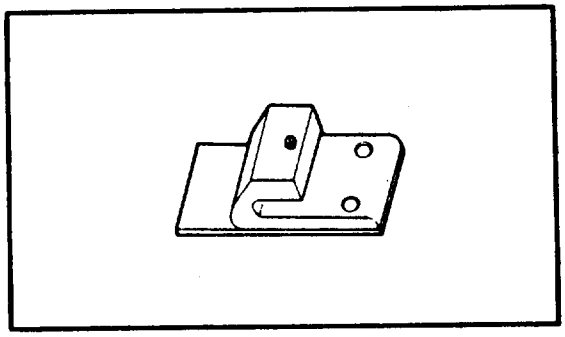
This mounting configuration is used when components or other protrusions occur up to 0.75 inches beyond the channel and side mounting is required.

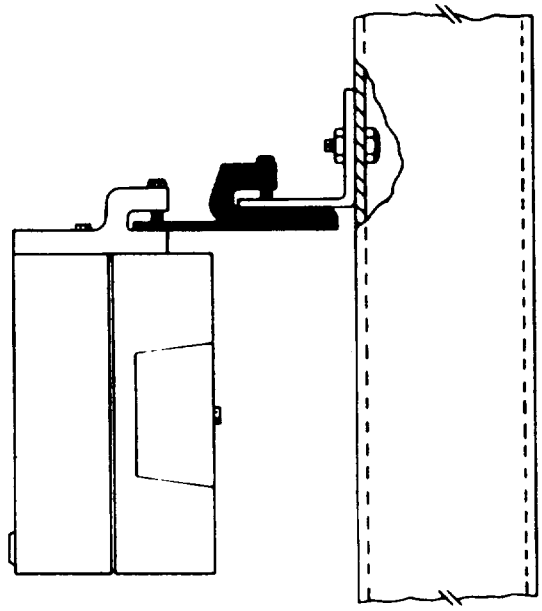




100114-3 VERTICAL

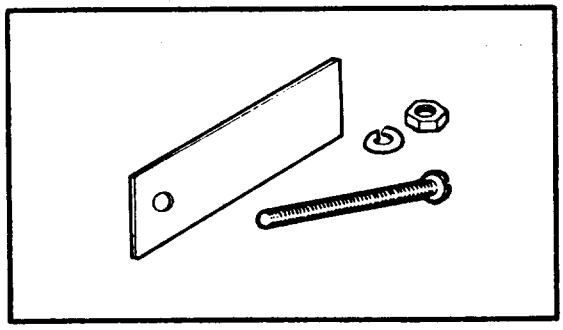
This bracket is used on ED-30427 type linefinder frames (or equivalent) when double angle iron sections preclude standard mounting.

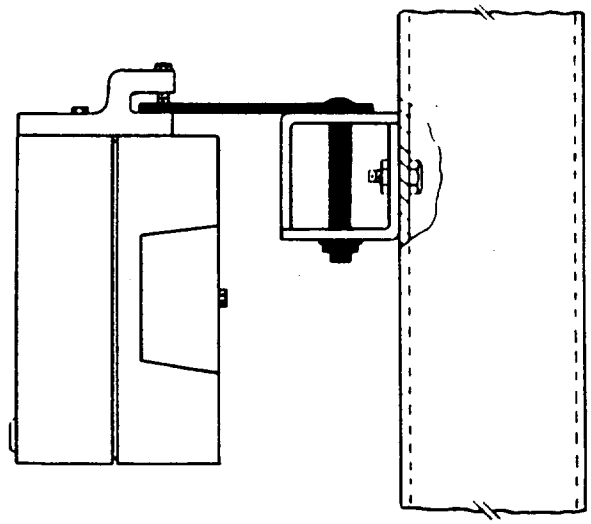




100114-4 EXTENDER

This bracket is intended as an extender for other brackets (shown here with the 100114-1 bracket) when protrusions occur up to 1.5 inches beyond the channel, providing that the converter does not extend beyond the guard rail. This bracket must be used in conjunction with one of the other brackets.





201036 BOXED ANGLE

This bracket (consisting of a metal strap and hardware) is used to mount converters to boxed angle sections which are drilled for 2¼-inch ¼-20 bolts.

6.0 INSTALLATION AND MOUNTING

(See Table 4.)

6.01 DIAL TONE

Lines to be converted should be equipped with precise dial tone. (350 Hz plus 440 Hz at -13 dBm per frequency.) Standard dial tones such as 600 Hz modulated by 120 Hz or 133 Hz have been successfully used. Harmonics generated by such dial tones must be at least 30 dB down from either Touch-Tone frequency in the range from 680 Hz to 1680 Hz. Failure to observe harmonic content may result in multiple conversion of Touch-Tone digits sent in the presence of dial tone.

6.02 FUSING

In step offices, the battery source for the linefinder is usually fused with approximately 1⅓ amp fuse per finder or a 5 amp fuse for each 5 linefinders. This fusing will serve to protect the Converter, since a converter will always operate after the linefinder has found the line requesting service—and the fusing will suffice for both the linefinder and the converter.

In #1 Crossbar Offices, sender fusing should be adequate to protect the Converter.

6.03 PRE-WIRING

Cables and connecting plugs can be delivered early for prewiring of an office. Model 205 Converter connecting plugs restore Tip and Ring continuity prior to Converter installation.

6.04 BRACKET MOUNTING

The long/short throat bracket provided with each Model 205 Converter can be mounted in one of four ways by removing the screws as shown on page 12. **Use 9/16" #4 screws only.**

6.05 INSTALLATION PROCEDURE

(A) Remove the Converter, its associated cable, and splices from the packing containers.
(B) Check the linefinder, transfer selector, or sender and when it is idle, make it busy.
(C) Remove the linefinder or sender fuse.
(D) Unsolder or unwrap the Tip and Ring leads from the jacks of the linefinder or the sender terminal block.
(E) Splice the white-orange lead of the cable to the Tip lead that was disconnected in step (D). Similarly, splice the orange-white lead of the harness to the Ring lead.
(F) Connect the white-blue and blue-white leads of the cable to the Tip and Ring of the linefinder or sender terminal block.
(G) Connect the red lead of the cable to the linefinder ground jack or to ground on the sender terminal block.
(H) Connect the white lead of the cable to the linefinder battery jack or to battery on the sender terminal block.
(I) Dress the cable along the existing wiring allowing enough slack for removal of the Converter.
(J) Replace the linefinder or sender fuse.

TABLE IV

	COLOR	FUNCTION	NOTES
INPUT	Blue/White White/Blue	Ring Sub Tip Sub	Normally from the linefinder. Normally from the linefinder.
OUTPUT	Orange/White White/Orange	Ring Co Tip Co	Normally to the first selector. Normally to the first selector.
POWER	White Red	Battery Ground	

6.06 MOUNTING THE CONVERTER IN STEP OFFICES

(A) Place the mounting bracket over the shelf angle iron approximately at the center of linefinder switch.

(B) In most Strowger installations, the shelf angle iron on which the Converter is to be located is positioned in such a manner that the Converter can be mounted directly in configuration.

(C) Tighten the locking screw with a screwdriver or a switch adjusting wrench until the Converter is secure. Do not overtighten the locking screw.

(D) Insert the plug of the Converter cable into the receptacle of the TonePulse Converter until it locks into place.

(E) To remove the plug, insert the screwdriver under one ear of the plug and pry outward.

6.07 MOUNTING THE CONVERTER IN #1 CROSSBAR OFFICES

(A) Mount the Adapter Bracket 201067 on the right side of the relay mounting plate immediately below the sender terminal blocks. First loosen both relay mounting plate screws. Slide the 201067 bracket under the screws as shown in Figure 8. Retighten the screws.

(B) Place the Converter mounting bracket on adapter bracket, tightening the locking screw.

(C) Insert the plug of the Converter cable into the receptacle of the TonePulse Converter until it locks in place.

(D) To remove the plug, insert a screwdriver under one ear of the plug and pry outward.

7.0 TESTING THE MODEL 205 CONVERTER

7.01 STEP INSTALLATIONS

(A) Connect a Touch-Tone telephone equipped with a proper plug to the linefinder test jacks.

(B) Touch-Tone a test number. Verify that the correct number has been reached and that a transmission path exits. Depress a button on the test telephone. Verify that no further outpulsing occurs.

(C) Touch-Tone a digit and hold the button down for an extended period of time (1 or 2 seconds)—no pulsing should occur. Release the button and the correct digit should be pulsed.

(D) Touch-Tone any digit. Wait approximately 20 seconds and attempt to TonePulse additional digits. Verify that no outpulsing occurs.

(E) Connect a rotary dial telephone (or hand test telephone) to the linefinder test jackets. Dial a test number. Verify that the desired number is reached.

8.0 REPAIR AND WARRANTY

8.01 American Telecommunications Corporation (ATC) offers a complete repair and return service and suggests the use of this facility for servicing the Model 205 TonePulse Converter.

8.02 A flat rate, as specified on the current pricing schedule, will apply to all units out of warranty and considered repairable as determined by ATC.

8.03 WARRANTY POLICY

The standard ATC warranty policy applies. Model 205 Converters are warranted against defective material and workmanship for a period of three years from the date of purchase. Units in warranty requiring servicing must be returned to ATC transportation prepaid. A return authorization must be secured by calling ATC Customer Service at (213) 579-1710.