

UPKEEP WORK UNITS
CENTRAL OFFICE EQUIPMENT — POWER
FORM E-4410

1. GENERAL

1.01 This section describes the method of counting and reporting equipment items for Central Office Power Equipment. It provides for (1) summarizing the number of each kind of plant item and (2) determining the number of work units for this type of equipment.

1.02 This section is reissued to renumber it into the Plant Series and to cover a revised Form E-4410 (5-64) which refers to the new Plant Series number. The revised form will not be available until present stock of Form E-4410 (1-63) is exhausted. Marginal arrows have been omitted in this process.

1.03 Section 015-100-010 covers general instructions applicable to all upkeep work unit forms. Section 015-000-000 contains a list of the sections describing the individual forms.

1.04 In all cases where a portable emergency engine is located off the central office premises but routined and maintained by the central office force, it should be inventoried on Form E-4410 for the office.

1.05 Form E-4410 does not cover plant items for power equipment installed in No. 8, 9, 10, or 12 offices, magneto or community dial offices or used for large PBX, except where such equipment is in addition to that required for the operation of the particular switchboard or dial switching equipment, such as:

(a) **130-Volt Batteries and Associated Charging Equipment:** Count items for batteries and associated charging equipment. (Do not count items for 24-volt batteries, ringing machines, or other power equipment normally found in local central offices and for which provision has been made in the plant item count for such offices.)

(b) **Portable Emergency Engine Generator Sets:** Count items as indicated on Lines 10 through 17. (Do not count items for engine generator sets permanently installed and intended for use in that particular office only.)

2. DESCRIPTION OF FORM E-4410

2.01 **Plant Item:** This column provides designations of the plant items for this class of equipment.

2.02 **Column A: No. of Plant Items: Other Co.:** This column is for showing plant items on which work is performed for another Company, when required by local instructions.

2.03 **Column B: No. of Plant Items: Total:** Enter the total number of each kind of plant item.

2.04 **Column C: W. U. per Plant Item:** This column provides a work unit factor for each kind of plant item which, when applied to the number of plant items entered in Columns A and B, gives the number of work units.

2.05 **Column D: Work Units per Qtr.: Other Co.:** Enter for each kind of plant item the result obtained by multiplying the number of plant items in Column A by the work unit factor in Column C. Work unit entries should be expressed to the nearest whole number.

2.06 **Column E: Work Units per Qtr.: Total:** Enter for each kind of plant item the result obtained by multiplying the number of plant items in Column B by the work unit factor in Column C. Work unit entries should be expressed to the nearest whole number.

Motor Generator Sets

2.07 **Line 1: Charging: M-1 to M-6 Type:** Covers M-1, M-2, M-3, M-4, M-5, M-5-1/2, and M-6 type motor generator charging sets and their associated switches, circuit breakers, rheostats, alarm circuits, etc.

Count one plant item for each set.

2.08 Line 2: Charging: M-7 to M-15 Type: Covers M-7, M-8, M-9, M-10 and M-15 type motor generator charging sets and their associated switches, circuit breakers, rheostats, alarm circuits, etc.

Count one plant item for each set.

2.09 Line 3: Charging: Commercial Type: Covers all size commercial type motor generator charging sets and their associated switches, circuit breakers, rheostats, alarm circuits, etc.

Count one plant item for each set.

2.10 Line 4: 38-Volt Supply: Covers motor generator sets provided for supplying 38- and 39-volt message register current.

Count one plant item for each set.

2.11 Line 5: 110- or 130-Volt Supply: Covers motor generator sets provided for supplying 110- and 130-volt current.

Count one plant item for each set.

2.12 Line 6: 16-, 18-, 20-, or 60-Cycle (Ringing Machine): Covers 16-, 18-, 20-, and 60-cycle and other motor-driven ringing machines.

Count one plant item for each set.

2.13 Line 7: 135- or 1000-Cycle Supply: Covers motor generator sets provided for supplying 135- and 1000-cycle signaling current.

Count one plant item for each set.

2.14 Line 8: Multi-frequency Supply (V.F. Carrier): Covers motor generator sets provided for supplying multi-frequencies to voice frequency carrier systems.

Count one plant item for each set.

Emergency Engines (Including Alternators)

2.15 Line 10: Gas — All Types: Covers all type emergency gas engines and includes generators, alternators, and starting motors.

Count one plant item for each engine.

2.16 Line 11: Gasoline — Kerosene: Covers all gasoline and kerosene emergency engines including generators and alternators.

Count one plant item for each engine.

2.17 Line 12: Other — (Homelite—Welding): Covers all other emergency engines, such as the Homelite or Welding, including generators and alternators.

Count one plant item for each engine.

2.18 Line 14: Fuel Oil (Diesel): Up to 60 KW: Covers all fuel oil (Diesel) emergency engines up to 60 kw including alternators.

Count one plant item for each engine.

2.19 Line 15: Fuel Oil (Diesel): 61 to 200 KW: Covers all fuel oil (Diesel) emergency engines from 61 to 200 kw including alternators.

Count one plant item for each engine.

2.20 Line 16: Fuel Oil (Diesel): 201 KW Up: Covers all fuel oil (Diesel) emergency engines from 201 kw up including alternators.

Count one plant item for each engine.

2.21 Line 17: Supplemental (For Continuous Operation): Covers a supplementary allowance for engines similar to those listed on Lines 10 through 16 when these engines are operated continuously to furnish power at locations not served by commercial power.

Count one plant item for each engine which is operated continuously.

Interrupters

2.22 Line 18: Motor-Driven: Four-Cycle Pole Changer: Covers four-cycle motor-driven pole changers.

Count one plant item for each machine.

2.23 Line 19: Motor-Driven: Other: Covers all type interrupters driven by individual motors, except 153 types and reciprocating bar type interrupters for which credit is included with associated apparatus.

Count one plant item for each machine.

2.24 Line 21: Vibrating Type: Covers 84-type interrupters and other vibrating interrupters or pole changers.

Count one plant item for each interrupter or pole changer.

Rectifiers

2.25 Line 23: Battery Charging: Covers the larger battery charging rectifiers of the Tungar (Argon or Mercury bulb) and the regulated tube type. Also includes the regulated metallic disc type, such as the KS-5651. Does not cover the unregulated tube or unregulated disc type used for charging small batteries at PBXs and small central offices or end cell trickle charging (see Line 25).

Count one plant item for each rectifier.

2.26 Line 24: Plate Supply: Covers regulated tube rectifiers used to supply the plate current for electron tubes in carrier, radio, video, etc. Also includes the rectifiers used for this purpose in local, toll, and TWX plants. Does not cover the rectifiers of the regulated metallic disc type used to supply current for filament or battery loads (see Line 25).

Count one plant item for each rectifier.

2.27 Line 25: Other: Covers all other small rectifiers of both the regulated metallic disc or the unregulated tube or disc type located in the central office power plant which are used for either charging small batteries at PBXs and small central offices or end cell trickle charging or current supply for filaments, relays or battery loads, wiring plans, TWX printers, etc.

Count one plant item for each rectifier.

Batteries

2.28 Line 26: Open Type: Type E: Covers type E storage batteries and their associated distributing panels, switches, etc.

Count one plant item for each cell.

2.29 Line 27: Open Type: Type F: Covers type F storage batteries and their associated distributing panels, switches, etc.

Count one plant item for each cell.

2.30 Line 28: Open Type: Type G: Covers type G storage batteries and their associated distributing panels, switches, etc.

Count one plant item for each cell.

2.31 Line 29: Open Type: Type H: Covers type H storage batteries and their associated distributing panels, switches, etc.

Count one plant item for each cell.

2.32 Line 30: Open Type: Other: Covers all open-type storage batteries and their associated distributing panels, switches, etc, except those of the E, F, G, and H types.

Count one plant item for each cell.

2.33 Line 31: Enclosed Type: Covers all enclosed-type storage batteries and their associated distributing panels, switches, etc.

Count one plant item for each cell.

2.34 Line 32: Counter EMF Cell: Covers all storage battery cells which are used to supply counter electromotive force.

Count one plant item for each cell.

2.35 Line 33: Elect. Cond. — 100 or 101 Type: Covers 100- and 101-type electrolytic condensers.

Count one plant item for each cell.

2.36 Line 34: Dry Cell: Covers all dry cell batteries.

Count one plant item for each individual dry cell and one plant item for each dry cell battery unit, such as 4-1/2, 22-1/2, 45-volt, etc.

Misc.

2.37 Line 36: Drive Motor (Dial Office): Covers drive motors and associated gear boxes, friction roll drives, vertical drive shafts, etc, in dial offices. Includes motors with Anderson relay.

Count one plant item for each motor.

2.38 Line 37: Converter (KS-5485 Type): Covers all converters or inverter-converters of the KS-5485 type.

Count one plant item for each converter and for each inverter or combination inverter-converter.

2.39 Line 38: Rectifier Inverter: Covers rectifier inverters which furnish power to L carrier lines.

Count one plant item for each rectifier inverter.

2.40 Line 39: Voltage Regulator: Covers all types of voltage regulators used for automatic control of voltage level of central office batteries except electronic type regulators.

Count one plant item for each regulator.

2.41 Line 40: Master or Relay Switch (Palmer): Covers Palmer master switches, Palmer relay switches, and any similar switches used for emergency lighting and/or emergency cell operation. Includes Anderson switches.

Count one plant item for each switch.

2.42 Line 42: Motor Alternator: Covers the "2 Motor Alternator" normally driven by an AC motor on the line and during an emergency from the battery motor. This alternator furnishes 230 volts AC and is the type used to furnish power on L carrier lines, submarine cable carrier and TH radio.

Count one plant item for each motor alternator.

2.43 Line 43: Pneumatic Tube System — Compressor: Covers power-driven compressors used for pneumatic tube systems.

Count one plant item for each compressor.

2.44 Line 44: Pneumatic Tube System — Exhauster: Covers power-driven exhausters used for pneumatic tube systems.

Count one plant item for each exhauster.

2.45 Line 47: Total Work Units: Enter the sum of the amounts on Lines 1 through 46 in Columns D and E.

2.46 Line 48: Upkeep Hours on this Equipment Charged to: Enter the subaccount to which upkeep hours for repairs of equipment on this form are charged. Use one sheet for each subaccount.

2.47 City-Office, District, Division, Company-Area, Qtr. Ending: Complete form by filling in office, district, division, company, and area. In quarter ending, show either March 31, June 30, September 30, or December 31, and the year.

UPKEEP WORK UNITS
CENTRAL OFFICE EQUIPMENT - POWER

PLANT ITEM	A		B	C	D	E	
	NO. OF PLANT ITEMS		W.U. PER PLANT ITEM	WORK UNITS PER QTR.			
	OTHER CO.	TOTAL		OTHER CO. (A x C)	TOTAL (B x C)		
MOTOR GENERATOR SETS (PER SET)	CHARGING	M - 1 TO M - 6 TYPE		30.10			
		M - 7 TO M - 15 TYPE		38.10			
		COMMERCIAL TYPE		39.40			
			38 VOLT SUPPLY		15.00		
			110 OR 130 VOLT SUPPLY		14.50		
			16,18,20 OR 60 CYCLE (RINGING MACHINE)		24.20		
			135 OR 1000 CYCLE SUPPLY		6.64		
			MULTI-FREQUENCY SUPPLY (V.F. CARRIER)		9.56		
EMERGENCY ENGINES (INCLUDING ALTERNATORS)		GAS - ALL TYPES		46.20			
		GASOLINE - KEROSENE		11.50			
		OTHER - (HOMELITE - WELDING)		7.68			
	FUEL OIL (DIESEL)	UP TO 60 KW		46.20			
		61 TO 200 KW		69.80			
		201 KW UP		92.40			
			SUPPLEMENTAL (FOR CONTINUOUS OPERATION)		130.00		
INTERRUPTERS	MOTOR-DRIVEN	FOUR-CYCLE POLE CHANGER		1.96			
		OTHER		5.76			
		VIBRATING TYPE		5.76			
RECTIFIERS		BATTERY CHARGING		6.64			
		PLATE SUPPLY		3.84			
		OTHER		1.96			
BATTERIES	OPEN TYPE (PER CELL)	TYPE E		.44			
		TYPE F		.60			
		TYPE G		1.72			
		TYPE H		2.44			
		OTHER		.36			
		ENCLOSED TYPE (PER CELL)		.28			
		COUNTER EMF CELL		.28			
		ELECT. COND. - 100 OR 101 TYPE (PER CELL)		.16			
	DRY CELL (PER CELL OR UNIT)		.08				
MISC.		DRIVE MOTOR (DIAL OFFICE)		1.96			
		CONVERTER (KS 5485 TYPE)		.68			
		RECTIFIER INVERTER		10.90			
		VOLTAGE REGULATOR		3.84			
		MASTER OR RELAY SWITCH (PALMER)		1.96			
		MOTOR ALTERNATOR		15.30			
		PNEUMATIC TUBE SYSTEM - COMPRESSOR		6.76			
		PNEUMATIC TUBE SYSTEM - EXHAUSTER		9.00			
TOTAL WORK UNITS (LINES 1 THRU 46)							

UPKEEP HOURS ON THIS EQUIPMENT CHARGED TO ACCOUNT <input type="text"/>	CITY-OFFICE
	DISTRICT
	DIVISION
	COMPANY-AREA
	QTR. ENDING

UPKEEP WORK UNITS
CENTRAL OFFICE EQUIPMENT — POWER
FORM E-4410

1. GENERAL

1.01 This section describes the method of counting and reporting equipment items for central office power equipment. It provides for summarizing key items of equipment and developing the number of work units for all central office power equipment.

1.02 This section is reissued to provide a simplified method of developing work units for central office power equipment. Under the new method, only key items of equipment representing the preponderance of the upkeep effort are inventoried. Work units for all the miscellaneous items of power equipment are developed, based on the number of key items inventoried. Although the type of miscellaneous items will vary between offices, studies indicate that the total upkeep hours required for miscellaneous items are relatively minor and are directly proportional to those required for the key items.

1.03 Section 015-100-010 covers general instructions applicable to all upkeep work unit forms. Section 015-000-000 contains a list of the sections describing the individual forms.

1.04 Before any attempt is made to analyze work unit data contained in this section or in any other section of the Plant Maintenance Expense Results Plan, Parts 1 and 2 of the Plan should be thoroughly reviewed. They cover the definitions of terms, interpretations, and use of results data and must be fully understood to use the Plan as a "management tool" for which it was designed. Parts 1 and 2 of the Plan are not issued as BSPs, and must be ordered in accordance with local company requirements.

1.05 Form E-4410 does not cover plant items for power equipment installed in magneto or community dial offices, except where such equipment is in addition to that required for the operation of the dial switching equipment (such as a 130-volt power plant).

2. DESCRIPTION OF FORM E-4410

2.01 *Plant Item:* This column provides description of the major plant items for this class of equipment.

2.02 *Column A: Number of Plant Items:* This column is for reporting the total number of plant items.

2.03 *Column B: Work Units per Plant Item:* This column provides a quarterly work unit factor for each major plant item.

2.04 *Column C: Work Units per Quarter:* Enter for each kind of plant item the result obtained by multiplying the number of plant items in column A by the work unit factor in column B. This provides quarterly work units which should be expressed to the nearest whole number.

2.05 *Line 1: Motor-Generator Charging Sets:* Covers all M-1 through M-10 and M-15 type motor-generator charging sets and all commercial-type motor-generator charging sets used for charging central office batteries. Also included on this line are *continuous running* motor-alternators providing AC for L carrier lines, submarine cable carrier, and TH radio.

Count one plant item for each motor-generator set and one for each *continuously running* motor-alternator set.

2.06 *Line 2: Ringing Plants:* Covers all 16-, 18-, 20-, or 60-cycle motor-driven ringing plants and 20-cycle solid-state ringing plants.

Count one plant item for each motor-driven ringing *machine* and one plant item for each solid-state ringing plant.

Note: for the purposes of this Plan, a solid-state ringing plant consists of two ringing supplies (regular and alternate).

Emergency Engine-Alternators

2.07 Lines 3 through 6 (General): Cover all emergency engines of more than 5 KW. Tally as appropriate on lines 3 through 6. Portable emergency engines 5 KW and less are included on line 10.

2.08 Line 3: Up to 60 KW (Including all turbine): Covers all emergency engine-alternators up to 60 KW, and all sizes of turbine-alternators.

Count one plant item for each appropriate engine-alternator and one for each turbine-alternator.

2.09 Line 4: 61 to 300 KW: Covers all emergency engine-alternators from 61 to 300 KW.

Count one plant item for each appropriate engine-alternator.

2.10 Line 5: Over 300 KW: Covers all emergency engine-alternators over 300 KW.

Count one plant item for each appropriate engine-alternator.

2.11 Line 6: Continuous Operation: Covers a supplementary allowance for engine-alternators similar to those listed on lines 3 through 5 when these engine-alternators are operated continuously to furnish power at locations not served by commercial power.

Count one plant item for each engine-alternator which is operated continuously.

2.12 Line 7: Rectifiers (Battery Charging): Covers all battery charging rectifiers used to charge 12-, 24-, 48-, 130-, or 152-volt central office batteries.

Count one plant item for each rectifier.

Note: Rectifiers such as those associated with EM cell trickle charge, emergency engines, superimposed or tripping supplies, plate current for electron tubes, etc, are included on line 10.

2.13 Line 8: Batteries — Wet Cell (per Cell): Covers all open and all closed *wet cell* central office batteries and counter EMF cells.

Count one plant item per cell.

2.14 Line 9: Subtotal (Lines 1 through 8): Enter in column C the sum of work units on lines 1 through 8.

2.15 Line 10: Miscellaneous Equipment Additive: The purpose of this line is to develop upkeep work units for all the miscellaneous power equipment over and above the key items listed on lines 1 through 8. Since the key items account for the majority of the central office power equipment upkeep hours, they are used to develop work units for the miscellaneous items. Although the type of miscellaneous equipment will vary between offices, the total upkeep hours expended on miscellaneous equipment are proportional to the upkeep hours expended on the key items.

The following is *not* a complete list, but gives examples of miscellaneous equipment items included on this line: small portable engines, tone and current supplies, interrupters, electrolytic condensers, dry cells, converters, inverters, master switches (including drive motors), voltage regulators, pneumatic tube systems, etc.

Multiply the subtotal on line 9 by .12, and enter the results in column C.

2.16 Line 11: Total Work Units: Enter the sum of the amounts on lines 9 and 10.

2.17 Upkeep Hours On This Equipment Charged To: Enter the subaccount to which upkeep hours are charged for the equipment on this form. Use one sheet for each subaccount.

2.18 City-Office, District, Division, Company-Area, Qtr. Ending: Complete form by filling in office, district, division, company, and area. For quarter ending, show March 31, June 30, September 30, or December 31, and the year.

Attached:

Form E-4410

UPKEEP WORK UNITS CENTRAL OFFICE EQUIPMENT - POWER

PLANT ITEM		A	B	C
		NUMBER OF PLANT ITEMS	WORK UNITS PER PLANT ITEM	WORK UNITS PER QUARTER (A × B)
1	MOTOR-GENERATOR CHARGING SETS		63.25	
2	RINGING PLANTS		32.17	
3	EMERGENCY ENGINE- ALTERNATORS	UP TO 60 KW (INCL. ALL TURBINE)	72.38	
4		61 TO 300 KW	89.56	
5		OVER 300 KW	118.26	
6		CONTINUOUS OPERATION	130.00	
7	RECTIFIERS (BATTERY CHARGING)		9.65	
8	BATTERIES - WET CELL (PER CELL)		1.29	
9	SUBTOTAL (LINES 1 THRU 8)			
10	MISCELLANEOUS EQUIPMENT ADDITIVE (C9 × .12)			
11	TOTAL WORK UNITS (C9 + C10)			

UPKEEP HOURS ON THIS EQUIPMENT CHARGED TO
ACCOUNT <input style="width: 50px; height: 20px;" type="text"/>

CITY-OFFICE	
DISTRICT	
DIVISION	
COMPANY-AREA	
QTR. ENDING	

WORK UNITS FOR PLANT UPKEEP AND CHANGES

GENERAL

1. GENERAL

1.01 This section describes the common items involved in Division 015 of the Plant Series. This division deals with inventories of equipment to develop work units and plant units for the Plant Maintenance Expense Results Plan.

1.02 This section is reissued to identify the various work unit forms with specific types of plant, accounts or types of work. Use of these forms is restricted as follows:

CENTRAL OFFICE "M"	OUTSIDE PLANT	UPKEEP		
		CENTRAL OFFICE	STATION	TESTING
E-4420	E-4415	E-4401	E-4411	E-4401
		thru	thru	E-4417
		E-4410	E-4414	E-4418
			E-4416	E-4438

1.03 Detailed instructions on the development of work units are covered in associated sections listed in Section 015-000-000.

2. USE OF FORMS — GENERAL

2.01 Count all plant items, frames or work operations which have their "upkeep or changes" hours charged to the reporting unit. A reporting unit is one for which a Summary Form E-2740 or E-4661 (or both) is prepared.

2.02 Inventory the equipment or plant items on the form on which it is listed. When "upkeep or changes" hours are charged to several accounts (for items listed on a single form) use separate copies of the form for each account. Use of the forms is limited to specific types of plant, accounts or types of work. See paragraphs 2.06 through 2.12 for restrictions pertaining to the use of work unit forms.

2.03 In general, upkeep inventories need not be changed more than once each quarter, and may be changed less often at the discretion of the company. However, it is recommended that a complete inventory recheck be made at least an-

nually. "Changes" work unit counts are on a monthly basis.

2.04 A section is provided on each form (usually at the bottom) for indicating the account code to which "upkeep or changes" hours are charged. This is to associate work units with corresponding hours by accounts.

2.05 *Work units are established on a System basis. No modifications of definitions or changes in the work unit factors printed on the standard work unit forms are authorized except by System-issued addenda, or by letter from the AT&T Company, Plant Operations Division.*

Central Office Upkeep

2.06 In some cases, equipment maintained in a specific office may require several forms in order to find the listing of all equipment. In such cases, fill out all the necessary forms, and indicate the proper account code for the office. Forms for this purpose are restricted to E-4401 through E-4410.

2.07 When additional central office equipment is scheduled for service during the quarter, the equipment installed may be considered as in service for the entire quarter; conversely, if central office equipment is to be retired during the quarter, it should not be included in the inventory.

2.08 For purposes of work unit inventory, "maintained" means in service or available for service by cross-connection, patching, or local wiring. However, if major items of plant, such as switchboard positions, are cut dead or are not maintained in condition for immediate use, they should be excluded.

Central Office Changes

2.09 Central office changes utilize the counts developed for Station Installation Cost Results Plan essentially; however, some work

SECTION 015-100-010

operations must be counted locally, such as trunk activity. These counts are on a monthly basis and summarized on Form E-4420.

Outside Plant and Station

2.10 These plant items may be obtained from the latest available accounting records or local records, if available, at the end of the first month of the quarter. These counts need not be changed more than once a quarter.

2.11 Form E-4415 has been provided for recording counts of outside plant items. For station accounts (18R, 28R, 38R and 58R) the counts of plant items are limited to Forms E-4411 through E-4414 and E-4416.

Testing

2.12 Subscriber line testing for plant service center work operations is reported on Form E-4438. The work units for trunk testing are limited to Forms E-4401, E-4417 and E-4418.

3. SUMMARY REPORTS

3.01 Unless specified by the local company or specially requested by the AT&T Company for study purposes, no consolidations of these work unit forms are required on a district, division, area, or company basis. Form E-2741, Summary of Maintenance Work Units and Plant Units, is provided to summarize the data from the various work unit forms.