# ITEC INC.

EMS-1

ELECTRONIC MODULAR SWITCH
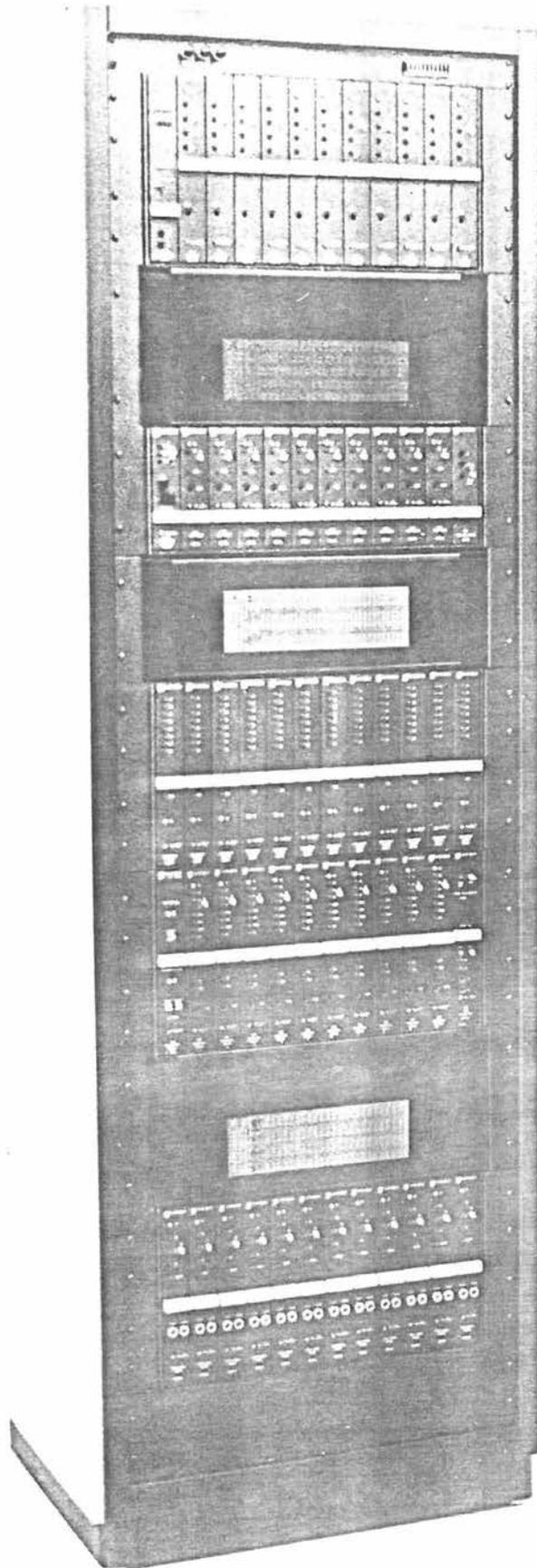
EMS-1 CABINETIZED

EMS-1

A DIRECT CONTROL WIRED LOGIC SWITCHING SYSTEM FOR ELECTROMECHANICAL CENTRAL OFFICES

The ITEC Electronic Modular Switch (EMS-1) is an electronic direct control switching system for making additions to your existing step-by-step exchanges. Using the EMS-1 is the most economical solution for making additions to existing step-by-step investments.

The flexible electronic modular design will allow additions to only those switching portions that need immediate attention. EMS-1 modules can be added as separate units: for line additions the Line/Linefinder Module, for selector additions the Selector Module (local first, intermediate or incoming applications), and for connector terminal additions the Connector Module. In those Central Offices that need a full switch train addition, the complete EMS-1 switch can be utilized. These modules can be mounted in relay racks or cabinets.

In offices where digital changeouts are scheduled and floor space in the existing building has been exhausted, the EMS-1 can ideally provide you space savings of up to 70%. The modular design allows for ease of installation and removal, so the EMS-1 investment can be relocated easily to other Central Offices.

EMS-1 will eliminate the expensive routine maintenance of electromechanical switches and at the same time improve your subscribers' service quality. The EMS-1 is a very economical method to modernize your existing plant investment without the major expense of replacing the complete switch.

EMS-1 is a proven design with over 100,000 lines in service within the independent and major telephone operating companies. This assures you of long-lasting service and support from ITEC, the Advanced Telecommunications Systems manufacturer.

Let our Proposal Engineers quote your requirements. They will provide detailed quotations with firm E F & I pricing. Find out how easy and economical it is to use the EMS-1.

CONSIDER THESE ADVANTAGES

- Proven — Over 100,000 Lines In Service
- One Basic Configuration For All Systems
- Add Lines, Selectors, Connectors Individually Or A Complete Switch Train
- Floor Space Savings Of Up To 70%
- Eliminates Expensive Building Additions
- Permits Non-Consecutive Numbering In PBX Groups
- Eliminates Expensive Routine Maintenance
- Reliability Of Electronics And The Simplicity Of SxS
- Free Training
- Delivery Off-The-Shelf
- Use Existing Power Plant
- REA Accepted

LINE AND LINEFINDER MODULE
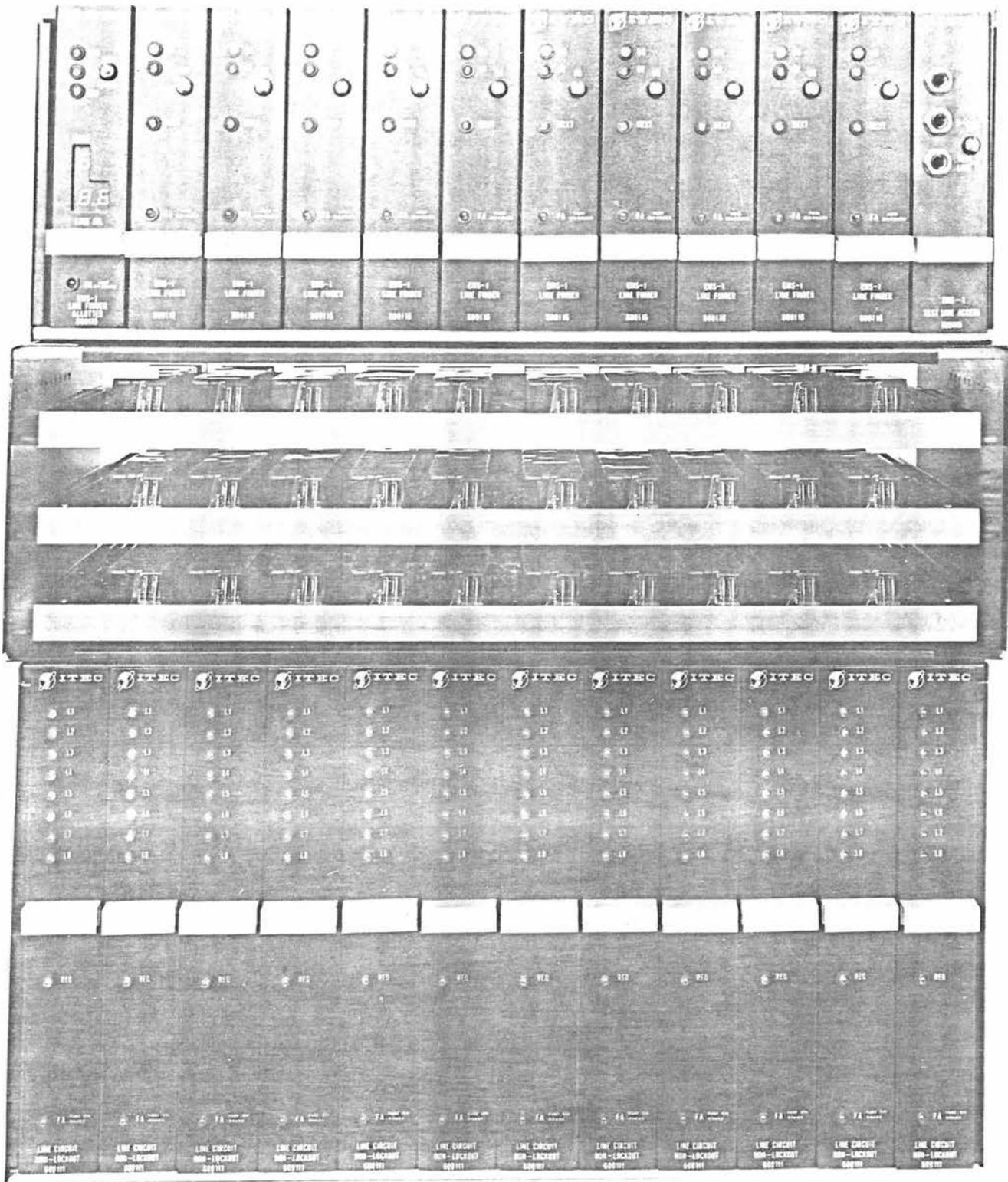
96 Lines with 10 Finders require only 24.5" of rack space.

EMS-1

LINE AND LINEFINDER MODULE

DESCRIPTION

The EMS-1 Line and Linefinder Equipment may be used for Non-Lockout, Lockout, and Lockout with Revertive Call applications in existing Step-by-Step and XY Systems. This module can be added individually to your present system or in combination with other EMS-1 Modules. It may also be used with EMS-1 Selectors and Connectors as a complete Switching System.

Major components of the EMS-1 Line and Linefinder Equipment consist of the Line Card (with 8 lines per Card), the Linefinder Card, the Allotter Card, the Line Test Card, and the Matrix Card.

The Lines and Linefinders with the associated Matrix Card(s) provide up to 96 Lines per Line/Linefinder Module.

FEATURES

STANDARD FEATURES include but are not limited to: • The Line Circuit features Lockout • Lockout with Revertive Call • Non-Lockout • 8 Lines per Card • Ground Start strapable per line • One Class Mark per Module strapable in increments of 8 Lines • LED display on faceplate indicating Line Busy • Lockout • Finder Request • Fuse Alarm • Permanent Signal.

The Linefinder features Level Restriction • Out of Service Switch • compatible with Common Mode Line Treatment Equipment • LED display on faceplate indicating next to be used • Busy • Fuse Alarm.

The Allotter Circuit features a digital readout indicating Line to Linefinder connection for testing • Meter Outputs for Peg Count • All Finders Busy (AFB) • Overflow • Delayed Call (Call Blocked) Output • faceplate LED display indicating All Finders Busy • Major Alarm • Minor Alarm • Fuse Alarm.

The Line Test Circuit features a Line Jack and A&B Jack to facilitate testing.

Connectorized Module for ease of installation.

OPTIONAL FEATURES — Tone Dialing is provided as a plug-on option to the Linefinder Circuit. It may be equipped initially or added later as required.

ORDERING INFORMATION

#1 Line and Linefinder Module 800010

—72 Module for up to 10 Linefinders, 23" RR Mtg.
—74 Module for up to 10 Linefinders, 24" Cabinet Mtg.

#2 Linefinders	#4 Line Circuits/Matrix Cards		
—1, 1 ea. 600116 Finder	—21, 8 Lines NLO,	1 ea. 600111,	1 ea. 600100
—2, 2 ea. 600116 Finder	—22, 32 Lines NLO,	4 ea. 600111,	1 ea. 600100
—3, 3 ea. 600116 Finder	—23, 40 Lines NLO,	5 ea. 600111,	2 ea. 600100
—4, 4 ea. 600116 Finder	—24, 64 Lines NLO,	8 ea. 600111,	2 ea. 600100
—5, 5 ea. 600116 Finder	—25, 72 Lines NLO,	9 ea. 600111,	3 ea. 600100
—6, 6 ea. 600116 Finder	—26, 96 Lines NLO,	12 ea. 600111,	3 ea. 600100
—7, 7 ea. 600116 Finder	—31, 8 Lines LO,	1 ea. 600110-1	1 ea. 600100
—8, 8 ea. 600116 Finder	—32, 32 Lines LO,	4 ea. 600110-1	1 ea. 600100
—9, 9 ea. 600116 Finder	—33, 40 Lines LO,	5 ea. 600110-1	2 ea. 600100
—10, 10 ea. 600116 Finder	—34, 64 Lines LO,	8 ea. 600110-1	2 ea. 600100
	—35, 72 Lines LO,	9 ea. 600110-1	3 ea. 600100
#3 Options	—36, 96 Lines LO,	12 ea. 600110-1	3 ea. 600100
	—41, 8 Lines LORC,	1 ea. 600110-2	1 ea. 600100
	—42, 32 Lines LORC,	4 ea. 600110-2	1 ea. 600100
	—43, 40 Lines LORC,	5 ea. 600110-2	2 ea. 600100
—15, 1 ea. 500190 Tone Dialing	—44, 64 Lines LORC,	8 ea. 600110-2	2 ea. 600100
	—45, 72 Lines LORC,	9 ea. 600110-2	3 ea. 600100
	—46, 96 Lines LORC,	12 ea. 600110-2	3 ea. 600100

NOTES

#1 Basic Module — The Line and Linefinder Module #800010 —72 or —74, consists of one Line Cage with Backplane #500044-32, or —34, one Linefinder Cage with Backplane #500033-22, or 24, one Matrix Card Cage #500045-3, or 43, one Allotter Circuit #600115, and one Linefinder Test Card #600118.

The —72 Module (23" Relay Rack Mounting) or —74 Module (24" Cabinet Mounting) will accommodate a maximum of 96 Lines, 10 Linefinders, and three Matrix Cards.

#2 QUANTITY OF LINEFINDERS — Order by dash number the quantity of Finders required.

#3 OPTIONS — Order dash number —15 when Tone Dialing is required. (Provided with each linefinder ordered).

#4 QUANTITY OF LINE CIRCUITS — Order quantity of lines by dash number for type (NLO, LO, LORC) required. Two cables, #652004 (Matrix to Lines) are provided for each matrix card equipped. For applications when revertive calls go into Lockout and have transmission battery provided from the line circuit, LORC Lines —42 thru —46 must be used.

Note: Order Terminal Blocks and Connectorized Cables as required, see page 5 listings.

EXAMPLE

Note Number	#1	#2	#3	#4
Basic Module and Dash Number	800010 —72, or —74	—10	—15	—26

CABLES
LINE AND LINEFINDER

ORDERING INFORMATION	
Female Connector One End (Tinned)	**Female Connectors Both Ends**
651025, 1 ea. 25 Feet, 25 Pair 651050, 1 ea. 50 Feet, 25 Pair 651075, 1 ea. 75 Feet, 25 Pair 651100, 1 ea. 100 Feet, 25 Pair 651125, 1 ea. 125 Feet, 25 Pair 651150, 1 ea. 150 Feet, 25 Pair 651200, 1 ea. 200 Feet, 25 Pair	652025, 1 ea. 25 Feet, 25 Pair 652050, 1 ea. 50 Feet, 25 Pair 652075, 1 ea. 75 Feet, 25 Pair 652100, 1 ea. 100 Feet, 25 Pair 652125, 1 ea. 125 Feet, 25 Pair 652150, 1 ea. 150 Feet, 25 Pair 652200, 1 ea. 200 Feet, 25 Pair

NOTES

LINES — Order two Cables for each Matrix Card equipped in the Module. Order length as required for Lines to MDF (T, R, S).

FINDER — Order one Cable per #800010 or #800012 Module, length as required for Linefinders to IDF (T, R, S, LR).

LINES AND LINEFINDER CABLES — Order Cables for Modules #800010 or 800012 from the above chart. Note that one group has connectors on both ends and one group has connectors on one end. The group with connectors on one end has Tinned Wire for wrapping on Terminal Block.

TERMINAL BLOCKS
LINES AND LINEFINDER

ORDERING INFORMATION	
#1 Lines MDF	**#2 Linefinder IDF**
100243, 1 ea. 6 x 26 Wire Wrap 100242, 1 ea. 6 x 24 Connectorized	100241, 1 ea. 8 x 26 Wire Wrap 100240, 1 ea. 8 x 25 Connectorized

NOTES

#1 LINES — Order two Blocks (Wire Wrap or Connectorized) per #800010 Module.

#2 LINEFINDERS — Order IDF Blocks as required. Each Block will accommodate 5 Modules (50 Linefinders T,R,S,LR).

#3 Terminal Blocks specified above are adjustable for 7, 7.5, or 8-inch mounting.

LINEFINDER OVERFLOW MODULE

DESCRIPTION

The EMS-1 Linefinder Overflow Module is an inexpensive method of adding Finders when more than 10 Finders per 96 Lines are required to accommodate the originating traffic rate. Through use of the Overflow Module up to 20 Finders per 96 Lines can be used. This configuration can accommodate traffic rates of up to 4.59 UC per Line. Standard EMS-1 Linefinder equipment is used with the inclusion of a transfer circuit that is activated by an All Finders Busy (AFB) signal thereby causing transfer to the Finder Overflow Module. Transfer back to the Primary Finders occurs upon an AFB condition in the Overflow Module. Allotter alarm conditions will also cause transfer.

In applications where a maximum of 15 Finders are required, the Overflow Module can be equipped with Matrix Cards equipped to accommodate only 5 Finders; this provides a considerable cost savings.

The Linefinder Overflow Module requires only 14 inches of rack space in a 23-inch relay rack.

EMS-1
LINEFINDER OVERFLOW

ORDERING INFORMATION	
#1 Linefinder Overflow Module 800012	
—72 Module for up to 10 Linefinders, 23" RR Mtg. —74 Module for up to 10 Linefinders, 24" Cabinet Mtg.	
#2 Linefinders	**#3 Optional Tone Dialing**
—1, 1 ea. 600116 Finders —2, 2 ea. 600116 Finders —3, 3 ea. 600116 Finders —4, 4 ea. 600116 Finders —5, 5 ea. 600116 Finders —6, 6 ea. 600116 Finders —7, 7 ea. 600116 Finders —8, 8 ea. 600116 Finders —9, 9 ea. 600116 Finders —10, 10 ea. 600116 Finders	—15, 1 ea. 500190 Tone Dialing
	#4 Matrix
	—31, 32 lines, 1 ea. 600100 Matrix Card —32, 64 lines, 2 ea. 600100 Matrix Card —33, 96 lines, 3 ea. 600100 Matrix Card —61, 32 lines, 1 ea. 600100-5 Matrix Card —62, 64 lines, 2 ea. 600100-5 Matrix Cards —63, 96 lines, 3 ea. 600100-5 Matrix Cards

NOTES

#1 BASIC MODULE — The Linefinder overflow module #800012 —72 or —74, consists of one Linefinder Cage with Backplane #500033 —22 or —24, Ribbon Cables #500203-05 (2 ea.) and #500203-06 (1 ea.), one Allotter Circuit #600115 and one Transfer Circuit #600114.

The —72 Module (23" Relay Rack Mounting) or —74 Module (24" Cabinet Mounting) will accommodate a maximum of 10 Linefinders.

#2 QUANTITY OF LINEFINDER — Order by dash number the quantity of Finders required.

#3 OPTIONS — Order dash number 15 when Tone Dialing is required. (Provided with each Linefinder ordered).

#4 MATRIX — Order dash number 31, 32 or 33 when up to ten Finders will be required in the overflow module. Dash number 31, 32, or 33 includes a #500045-03 Matrix Cage. Order dash number 61, 62, or 63 when a maximum of five Finders will be required in the overflow module. Dash number 61, 62, or 63 includes a #500045-13 Matrix Cage. Two cables #652004 are provided for each Matrix Card to multiple Linefinder Overflow Module to the primary Line/Linefinder Module.

NOTE: Order Terminal Blocks and Connectorized Cables as required. See page 5 for listings.

See system diagram on page 19.

SELECTOR MODULE
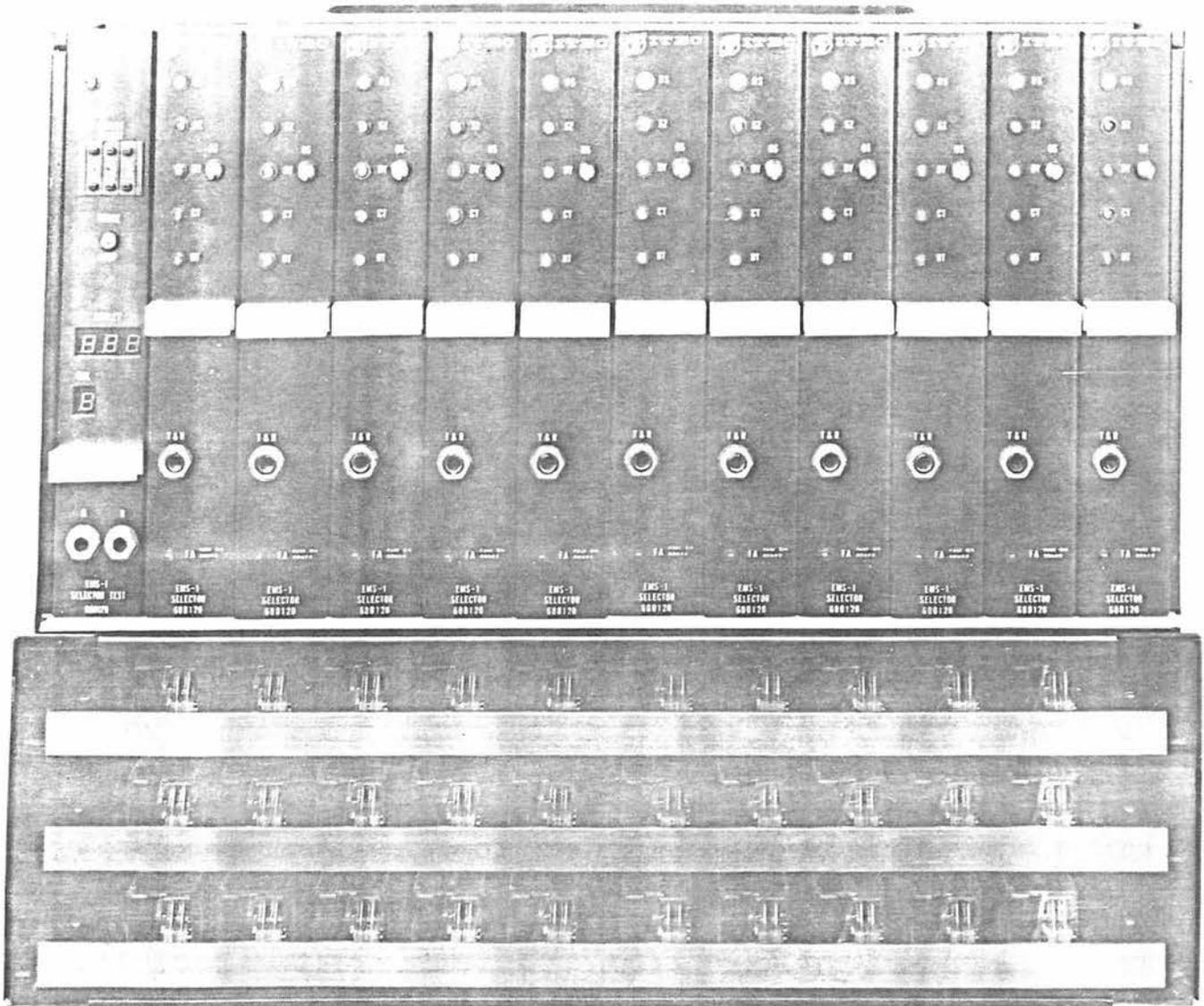
10 Selectors with 96 outlets require only 17.5" of rack space.

EMS-1
SELECTOR MODULE

DESCRIPTION

The EMS-1 Selector may be used for Local First, Local or Toll Intermediate, Incoming EAS or Toll (SX or Loop Dialing) applications in existing Step-by-Step and XY Systems.. This module can be added individually to your present system or in combination with other EMS-1 Modules. It may also be used with EMS-1 Lines and Connectors as a complete Switching System.

Major components of the EMS-1 Selector Equipment consist of the Selector Card, Selector Test Card, and the DTA assembly.

The Selector Card, receives and translates subscriber dialing and selects the appropriate level and Matrix outlet.

This Circuit may be added to either 3-wire (Loop Supv.) or 4-Wire (4th Wire Supv.) Systems. The Selector, in conjunction with its associated Matrix Card(s), has the capability of up to 160 outlets for 3-Wire Systems and 120 outlets for 4-Wire Systems. Level size is flexible from one to 40 outlets per level, selected by strapping. Different size levels can be assigned in the same module, assignment of up to 14 levels is possible.

FEATURES

STANDARD FEATURES include but are not limited to: • Absence of Ground or Battery Searching • Simplex or Loop Dialing • 1900 ohm Loop operation • Busy Key • Level Overflow leads • LED Status Display on faceplate to monitor Out of Service • Selector Busy • Cut Through • Busy Tone returned and Fuse Alarm. A Selector Test Card is provided with each Selector Module. The Test Card enables calls to be traced and to test each Selector to each outlet. Status is displayed numerically on the Test Card faceplate. The Selector is supplied with Multiple-digit absorption (MDA) capability as standard. MDA functions are: • Absorb repeatedly (before or after unlocking) • Absorb and Unlock • Reuse of Digits after Unlocking • Level Blocking (returns 120 IPM Busy Tone) • 14 Levels (Levels 11 through 14 are accessed by intercept or, two, three, or four Digit Translation Codes) • Capability of up to four translated codes • Class of Service Restriction of up to three Levels.

Connectorized Module for ease of installation.

OPTIONAL FEATURES AVAILABLE AS PLUG-ON MODULES

DIAL TONE — For first Selector application.

TROUBLE TIMING OPTIONS — Release Selector after one, two, or four minutes (Selectable) if dialing has not occurred. Used only with Lockout Line Circuits.

FUSE FAILURE BUSY — Busies out Selector with blown fuse, used in Absence of Ground Searching Systems. Use with complete EMS-1 Exchange.

ORDERING INFORMATION

#1 Selector and Matrix Card Module 800020

—72 Module for up to 10 Selectors, 23" RR Mtg.
—74 Module for up to 10 Selectors, 24" Cabinet Mtg.
—77 Module for up to 10 Selectors, 27" Cabinet/RR Mtg.

#2 Selectors	#3 Options	#5 Matrix Cards	3 W Outlets 4W	

—1, 1 ea. 600120 Sel.
—2, 2 ea. 600120 Sel.
—3, 3 ea. 600120 Sel.
—4, 4 ea. 600120 Sel.
—5, 5 ea. 600120 Sel.
—6, 6 ea. 600120 Sel.
—7, 7 ea. 600120 Sel.
—8, 8 ea. 600120 Sel.
—9, 9 ea. 600120 Sel.
—10, 10 ea. 600120 Sel.
	—13, 500172 Dial Tone
	—14, 500173 Trouble Timing
	—15, 500097 Fuse Failure Busy
	
	#4 Matrix Cage
	
	—23, 500045 (—3 or —43)
	Holds 3 cards, 23" RR or 24" Cabinet
	—24, 500045 (—4 or —44)
	Holds 4 cards, 23" RR or 24" Cabinet
	—25, 500045 (—5 or —45)
	Holds 5 cards, 23" RR or 24" Cabinet
		—31, 1 ea. 600100
		—32, 2 ea. 600100
		—33, 3 ea. 600100
		—34, 4 ea. 600100
		—35, 5 ea. 600100
		—36, 3 ea. 600100}
		    1 ea. 600101}
		—37, 4 ea. 600100}
		    1 ea. 600102}
			32 24
			64 48
			96 72
			128 96
			160 120
			100 —
			
			— 100	

#6 DTA

—40, 500183, 3-Wire DTA Assembly
—41, 500184, 4-Wire DTA Assembly
For Fanning Strip See Note #7.

NOTES

#1   BASIC MODULE — The Selector and Matrix Card Module #800020 —72, —74 or —77, consists of one Selector Cage with Back Plane #500044 —22, —24, or —27, one Selector Test Card #600129, and one Matrix Card Cage #500045. The dash numbers, as shown in the example below, denote how the Module can be equipped.

The —72 Module is for 23" Relay Rack Mounting, the —74 Module is for 24" Cabinet Mounting and the —77 is for 27" Relay Rack or Cabinet Mounting. Each configuration will accommodate a maximum of 10 selectors. EXAMPLE: If 22 Selectors are required, order two each 800020-10 and one each 800020-2.

#3   OPTIONS — Order dash number as required.

#4   MATRIX CAGE — Order dash number 23 if accommodations for three Matrix Cards is required. Order dash 24 for four Matrix Cards, and dash 25 for five Matrix Cards.

#5   MATRIX CARDS — Order Matrix Cards as required for 3- or 4-Wire Systems per the number of outlets needed.

EXAMPLE: —33 for three Matrix Cards.

#6   DTA — Order DTA dash number 40 or 41 as required where new DTA is being established. Each DTA consists of one DTA Block and two connectorized Matrix Cables #652005, for each Matrix Card ordered. Mounting Hardware #500037, is provided for mounting the DTA in a 23-inch Rack. Order Grading Blocks and Cable from page 11 if dash 40 or 41 is not ordered.

#7   FANNING STRIP — Order DTA Fanning Strip 500039 as required. One for each major division point in the grading multiple is recommended.

**   GENERAL — Reference notes #5 and #6 above. Order equipment for 4-Wire operation ONLY for Systems actually utilizing 4th Wire Supervision Control.

EXAMPLE

Note Number	#1	#2	#3	#4	#5	#6
Basic Module and Dash Number	800020 —72, —74 or —77	—10	—13 —15	—23	—33	—40

CABLES
EMS-1
SELECTOR, GRADING, OGT AND IDF

ORDERING INFORMATION	
Female Connector One End (Tinned)	**Female Connector Both Ends**
651025, 1 ea. 25 Feet, 25 Pair 651050, 1 ea. 50 Feet, 25 Pair 651075, 1 ea. 75 Feet, 25 Pair 651100, 1 ea. 100 Feet, 25 Pair 651125, 1 ea. 125 Feet, 25 Pair 651150, 1 ea. 150 Feet, 25 Pair 651200, 1 ea. 200 Feet, 25 Pair	652025, 1 ea. 25 Feet, 25 Pair 652050, 1 ea. 50 Feet, 25 Pair 652075, 1 ea. 75 Feet, 25 Pair 652100, 1 ea. 100 Feet, 25 Pair 652125, 1 ea. 125 Feet, 25 Pair 652150, 1 ea. 150 Feet, 25 Pair 652200, 1 ea. 200 Feet, 25 Pair

NOTES

DTA—When the ITEC DTA dash 40 or 41 is ordered, 5-foot Connectorized Cables will be supplied to connect the DTA to the Matrix Cards.

OGT — Order OGT Cables for OGT Block to succeeding equipment as required.

GRADING — On additions where Grading Blocks are to be mounted in existing Selector Shelves or existing DTA are going to be half tapped, order two Cables per Matrix Card as required.

SELECTORS — Order one Cable per #800020 Module to IDF as required.

TERMINAL BLOCKS

SELECTOR, GRADING, OGT AND IDF

#1 IDF Blocks	**#3 OGT/Grading Blocks**
100248, 1 ea. 10 x 25 Connectorized 100249, 1 ea. 10 x 26 Wire Wrap	100232, 1 ea. 6 x 64, 3W Connectorized 100233, 1 ea. 8 x 60, 4W Connectorized 100231, 1 ea. 9 x 70, Wire Wrap
#2 Mounting Assembly for OGT Blocks	**#4 Bay Supervisory Block**
500036 —00, 1 ea. 23" OGT Block Mounting Assembly 500036 —77, 1 ea. 27" OGT Block Mounting Assembly	500038 Supervisory Block Assembly

NOTES

#1 IDF — Order IDF Blocks as required. Each Block will accommodate 5 modules (50 Selectors T,R,S,4W,LR).

#2 MOUNTING ASSEMBLY — Order as required for mounting OGT Blocks in 23-inch or 27-inch Relay rack.

#3 (A) OGT BLOCKS — When the ITEC DTA dash 40 or 41 is used OGT Blocks will be required.
Each Connectorized Block will handle 128 circuits for 3-wire systems and 120 circuits for 4-wire systems.
Each Wire Wrap Block will handle 210 circuits for 3-wire systems and 140 circuits for 4-wire systems.

(B) GRADING BLOCKS — On additions where Grading Blocks are to be mounted in existing Selector Shelves, order Grading Blocks as required.

#4 BAY SUPERVISORY BLOCK — Order when required for office miscellaneous leads multiple.

#5 The IDF Terminal Blocks specified above are adjustable for 7, 7.5, or 8 inch mounting.

CONNECTOR MODULE
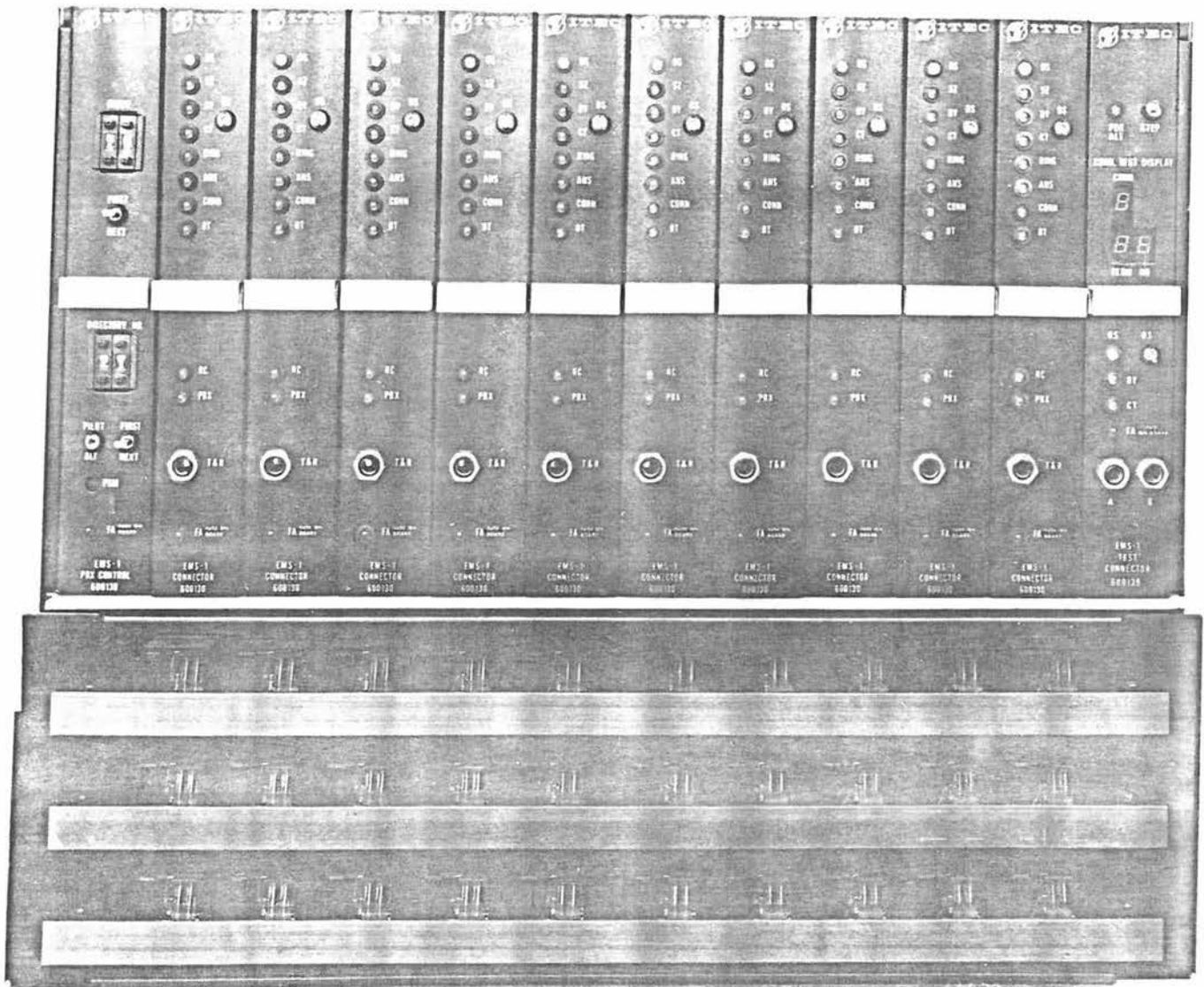
96 Terminals require only 17.50" of rack space (3 wire).

EMS
CONNECTOR MODULE

DESCRIPTION

The EMS Connector may be used for individual or Trunk Hunting applications in existing Step-by-Step and XY Systems. The module can be added individually to your present system or in combination with other EMS-1 Modules. It may also be used with EMS-1 Lines and Selectors as a complete Switching System.

Major components of the Connector Equipment consist of the basic Connector Card, Optional Features, Test Connector, and the Matrix Cards.

The Circuit may be added to either 3-Wire or 4-Wire Systems. The Connectors with the associated Matrix Card(s) provide up to 96 Terminals per Connector Module (100# operation optional).

FEATURES

STANDARD FEATURES include but are not limited to: • Terminal per Station operation • Single Frequency ringing for one and two party operation • Strapable Battery or Ground Connected Generator •1900 ohm Loop capability with 23mA transmitter current at 51.6 volts • Compatible with Common Module Line Treatment equipment • Called Party Hold by strap option to allow Nuisance Call Tapping • Peg Count Meter Output • LED Status Display on faceplate. A Test Connector is provided with each Module. The Test Connector provides test and verification distributor access and aids in call tracing. A digital display on the faceplate indicates the terminal the Connector has accessed.

Connectorized Module for ease of installation.

OPTIONAL FEATURES AVAILABLE

PBX HUNTING — is provided by simply equipping the Connector Module with the optional PBX Control Card. The PBX Control Card Faceplate has controls for programming group and number assignments. PBX Rotary Hunting is assignable up to 48 PBX Groups per Module, and a group can be any size up to 96 Terminals. Rotary alternate numbers (Terminals) can be assigned at random which permits non-consecutive assignment of numbers. This feature allows growth of PBX groups without reserving consecutive numbers as any vacant number can be used. For large PBX groups, Connector Modules may be added together to provide additional traffic capacity.

REVERTIVE CALL — Provides Revertive Call By Directory Number.

AUTOMATIC INTERCEPT — Connects unassigned connector terminals to intercept equipment. Access is via output pins on the connector module backplane.

REVERTIVE CALL/AUTOMATIC INTERCEPT — Provides the functions of both the Revertive Call and Automatic Intercept features.

TIMED RELEASE — Release Connector after one, two, or four minutes (selectable) if not answered as provides Post Supervision Disconnect Timing of 23 seconds.

SELECTIVE RINGING — Frequency Mark, Superimposed or Coded Ringing. NOTE: This method requires 4-Wire Matrix.

FUSE FAILURE BUSY — Busies out Connector with blown fuse, used in Absence of Ground Searching Systems.

LAST PARTY RELEASE — Allows revertive calls to hold connector after revert call switch releases.

NU TONE/+ BATTERY METERING — Provides tone to calling party for unassigned numbers. Provides +48V pulse on sleeve for call metering.

3rd DIGIT TPL — Allows third digit ringing control.

ORDERING INFORMATION			
#1 Connector and Matrix Card Module 80030			
—72 Module for up to 10 connectors, 23" RR Mtg. —74 Module for up to 10 connectors, 24" Cabinet Mtg. —77 Module for up to 12 connectors, 27" cabinet/RR Mtg.			
#2 Connectors	**#3 Options**	**#4 Matrix Cages**	
— 1, 1 ea. 600130 Conn. — 2, 2 ea. 600130 Conn. — 3, 3 ea. 600130 Conn. — 4, 4 ea. 600130 Conn. — 5, 5 ea. 600130 Conn. — 6, 6 ea. 600130 Conn. — 7, 7 ea. 600130 Conn. — 8, 8 ea. 600130 Conn. — 9, 9 ea. 600130 Conn. —10. 10 ea. 600130 Conn. —11. 11 ea. 600130 Conn. —12. 12 ea. 600130 Conn.	—11. 500185, Revt. Call by Dir. # —12. 500097, Fuse Failure Busy —13. 500188, Last Party Release —14. 500092, Timed Release —15. 500186, Freq. Mark/Coded Ring —16. 500187, Superimposed Ring —17. 500185-1, Automatic Intercept —18. 500185-2, Revt. Call/Auto Intercept —19. 500189, Nu-Tone/Metering —20. 600138, PBX Control —21. 500196, 3 Digit TPL Operation	—23. 500045 (—3, 43, or 37) Holds 3 cards, 23"RR, 24" Cabinet, or 27" RR —24. 500045 (—4, 44, or 47) Holds 4 cards, 23"RR, 24" Cabinet, or 27" RR —25. 500045 (—5, 45, or 57) Holds 5 cards, 23"RR, 24" Cabinet, or 27" RR —27. 500045-73 Holds 3 cards, 27" Cabinet —28. 500045-74 Holds 4 cards, 27" Cabinet —29. 500045-77 Holds 5 cards, 27" Cabinet	

#5 Matrix Cards	3W	Term 4W
—31. 1 ea. Matrix Card	32	24
—32. 2 ea. Matrix Cards	64	48
—33. 3 ea. Matrix Cards	96	72
—34. 4 ea. Matrix Cards	—	96
—36. 4 ea. Matrix Cards	100	
—37. 5 ea. Matrix Cards	—	100

NOTES

#1 BASIC MODULE — The Connector and Matrix Card Module #800030 —72, —74 or —77 consists of one Connector Cage with Backplane #500044-42, —44, or —47 for 23", 24" or 27" mounting, one Test Connector #600139-00 or —01, and one Matrix Card Cage #500045.

The Basic Module, —72 or —74 for 10 Connectors or —77 for 12 Connectors, accommodates the Test Connector, a PBX Control Circuit, and up to five Matrix Cards (See Note #4). Specify —72 for 23" RR mounting, —74 for 24" cabinet mounting, or —77 for 27" RR or cabinet mounting. The 600139-00 Test Connector is provided with the —72 and —74 (10 connector configuration), and the 600139-01 Test Connector is provided with the —77 (12 connector configuration).

#2 QUANTITY OF CONNECTORS — Order by dash number the quantity of Connectors required.

#3 OPTIONS (GENERAL) — Order by dash number as required. EXAMPLE: —11 (Revertive Call). —14 (Timed Release).

RINGING OPTIONS — Single Frequency (or Freq. per shelf) Interrupted Generator — No option required.
—Single Frequency (or Freq. per shelf) Continuous Generator —15, 500186 required.
—Frequency Marking, (Multi-Freq.) —15, 500186 and 4W (extra matrix card) required.
—Coded (Single Freq.) —15, 500186 and 4W (extra matrix card) required.
—Superimposed (Single Freq.) —16, 500187 and 4W (extra matrix card) required.
—3rd Digit TPL —21, 500196 Ring Frequency Selective by 3rd digit dialed.

#4 Matrix Cage — Order by dash number the matrix cage required to accommodate the ultimate number of matrix cards to be equipped for mounting configuration specified.

#5 MATRIX CARDS — Order Matrix Cards as required for 3-wire or 4-wire systems per number of terminals needed. (4th wire is required for Selective Ringing only.)
—72 Module Matrix Card is 600100
—74 Module Matrix Card is 600100
—77 Module Matrix Card is 600105
For 100 number operation, specify —36 for 3-wire or —37 for 4-wire.
NOTE: Order Terminal Blocks and Connectorized Cable as required.

EXAMPLE

Note Number	#1	#2	#3	#4	#5
Basic Module and Dash Number	800030 —72, —74 or —77	—10	—11 —14	—23	—33

EMS CONNECTOR OVERFLOW MODULE

DESCRIPTION
EMS Connectors may be used for Individual or Trunk Hunting applications in existing Step-by-Step and XY Systems. This module can be added individually to your present system or in combination with other EMS Modules.

Major components of the Connector Overflow Module Equipment consist of the basic Connector Card, Optional Features, Test Connector and the Matrix Cards.

The Circuit may be added to either 3-Wire or 4-Wire Systems. The Connectors with the associated Matrix Card(s) provide up to 100 Terminals per Connector Overflow Module.

FEATURES
Connector circuit in overflow module must be arranged to operate the same as those in the primary module.

STANDARD FEATURES include but are not limited to: • Terminal per Station operation • Single Frequency Ringing for one and two party operation • Strappable Battery or Ground Connected Generator • 1900 ohm Loop capability with 23mA transmitter current at 51.6 volts • compatible with Common Mode Line Treatment equipment • Called Party Hold by strap option to allow Nuisance Call trapping • Peg Count Meter Output • LED Status Display on faceplate. A Test Connector is provided with each Module. The Test Connector provides test and verification distributor access and aids in call tracing. A digital display on the faceplate indicated the terminal the Connector has accessed.

Connectorized Module for ease of installation.

OPTIONAL FEATURES AVAILABLE
The overflow module must be equipped with the same optional features as the primary module.

PBX HUNTING — is provided by simply equipping the Connector Module with the optional PBX Control Card. The PBX Control Card Faceplate has controls for programming group and number assignments. PBX Rotary Hunting is assignable up to 48 PBX Groups per Module, and a group can be any size up to 96 Terminals. Rotary alternate numbers (Terminals) can be assigned at random which permits non-consecutive assignment of numbers. This feature allows growth of PBX groups without reserving consecutive numbers as any vacant number can be used. For large PBX groups, Connector Modules may be added together to provide additional traffic capacity.

REVERTIVE CALL — Provides Revertive Call by Directory Number.

AUTOMATIC INTERCEPT — Connects unassigned connector terminals to intercept equipment. Access is via output pins on the connector module backplane.

REVERTIVE / AUTOMATIC INTERCEPT — Provides the functions of both the Revertive Call and Automatic Intercept features.

EMS CONNECTOR OVERFLOW MODULE

TIMED RELEASE — Release Connector after one, two, or four minutes (selectable) if not answered and provides Post Supervision Disconnect Timing of 23 seconds.

SELECTIVE RINGING — Frequency Mark, Superimposed or Coded Ringing. NOTE: This method requires 4-wire Matrix.

FUSE FAILURE BUSY — Busies out Connector with blown fuse, used in Absence of Ground Searching Systems.

LAST PARTY RELEASE — Allows revertive calls to hold connector after revert call switch releases.

NU TONE/+BATTERY METERING — Provides tone to calling party for unassigned numbers. Provides +48V pulse on sleeve or call metering.

MATRIX CARDS — Three matrix card configurations are available to provide the most cost effective use of the overflow module.

A. Matrix Cards are available to provide up to 100 terminals when the overflow module is to be used with the 10 connector or 12 connector configuration.

B. Matrix Cards are available to provide up to 100 terminals for two groups of up to 5 connectors each. This allows a single overflow module to be installed to accommodate two seperate connector groups. This arrangement provides savings on initial cost and space. This configuration can not be used for PBX Hunting Application. Available only in —72 or —74 (10 connector) module configuration.

C. Matrix Cards are available to provide up to 100 terminals when the overflow module is to be equipped with a maximum of 5 connectors. Initial cost savings are achieved with this configuration. Available only in —72 or —74 (10 connector) module configuration.

EMS
CONNECTOR OVERFLOW

ORDERING INFORMATION				
#1 Connector and Matrix Card Module 800032 —72 Module for up to 10 connectors, 23" RR Mtg. —74 Module for up to 10 connectors, 24" Cabinet Mtg. —77 Module for up to 12 connectors, 27" Cabinet/RR Mtg.				
#2 Connectors	**#3 Options**	**#4 Matrix Cages**	**#5 Matrix Cards**	**3W Term. 4W**

— 1, 1 ea. 600130 Conn.
— 2, 2 ea. 600130 Conn.
— 3, 3 ea. 600130 Conn.
— 4, 4 ea. 600130 Conn.
— 5, 5 ea. 600130 Conn.
— 6, 6 ea. 600130 Conn.
— 7, 7 ea. 600130 Conn.
— 8, 8 ea. 600130 Conn.
— 9, 9 ea. 600130 Conn.
—10, 10 ea. 600130 Conn.
—11, 11 ea. 600130 Conn.
—12, 12 ea. 600130 Conn.
	—11, 500185, Revt. Call by Dir. #
	—12, 500097, Fuse Failure Busy
	—13, 500188, Last Party Release
	—14, 500092, Timed Release
	—15, 500186, Freq. Mark/ Coded Ringing
	—16, 500187, Superimposed Ringing
	—17, 500185, Automatic Intercept
	—18, 500185-2, Revt. Call/ Auto Intercept
	—19, 500189, Nu-Tone/ Metering
	—20, 600138, PBX Control
	—21, 500196, 3 Digit TPL Operation
		—72; 23" RR mounting
		  —23, 500045-3 Holds 3 cards
		  —24, 500045-4 Holds 4 cards
		  —25, 500045-5 Holds 5 cards
		  —26, 500045-13 Holds 3 cards overflow
		  —27, 500045-14 Holds 4 cards overflow
		  —28, 500045-15 Holds 5 cards overflow
		—74 24" Cabinet mounting
		  —23, 500045-43 Holds 3 cards
		  —24, 500045-44 Holds 4 cards
		  —25, 500045-45 Holds 5 cards
		  —26, 500045-53 Holds 3 cards overflow
		  —27, 500045-54 Holds 4 cards overflow
		  —28, 500045-55 Holds 5 cards overflow
		—77; 27" RR/Cabinet mounting
		  —23, 500045-37 Holds 3 cards 27" RR
		  —24, 500045-47 Holds 4 cards 27" RR
		  —25, 500045-57 Holds 5 cards 27" RR
		  —27, 500045-73 Holds 3 cards 27" Cabinet
		  —28, 500045-74 Holds 4 cards 27" Cabinet
		  —29, 500045-75 Holds 5 cards 27" Cabinet
			—33, 3 ea. Matrix Cards
			—34, 4 ea. Matrix Cards
			—36, 4 ea. Matrix Cards
			—37, 5 ea. Matrix Cards
			—43, 3 ea. 600140
			—44, 4 ea. 600140
			—46, 3 ea. 600140 } 1 ea. 600140
			—47, 4 ea. 600140 } 1ea. 600142
			—63, 3 ea. 600100-05
			—64, 4 ea. 600100-05
			—66, 3 ea. 600100-05} 1 ea. 600101-05
			—67, 4 ea. 600100-05} 1 ea. 600102-05
				96 72
				— 96
				100 —
				— 100
				96 72
				— 96
				100 —
				— 100
				96 72
				— 96
				100 —
				— 100

NOTES

#1 BASIC MODULE — The Connector overflow and Matrix Card Module #800032 —72, —74 or —77, consists of one Connector Cage with Backplane #500044-42, or —47 for 23", 24", or 27" mounting, one Test Connector #600139-00 or —01, and one Matrix Card Cage #500045.

The Basic Module, —72 or —74 for 10 Connectors or —77 for 12 Connectors, accommodates the Test Connector, a PBX Circuit, and up to five Matrix Cards (See Note #4). Specify —72 for 23" RR mounting, —74 for 24" cabinet mounting, or —77 for 27" RR or cabinet mounting. The 600139-00 Test Connector is provided with the —72 and —74 (10 connector configuration), and the 600139-01 Test Connector is provided with the —77 (12 connector configuration).

#2 QUANTITY OF CONNECTORS — Order by dash number the quantity of Connectors required.

#3 OPTIONS (GENERAL) — Order dash number as required. EXAMPLE: —11 (Revertive Call), —14 (Timed Release).

RINGING OPTIONS — Single Frequency (or Freq. per shelf) Interrupted Generator — No option required.

— Single Frequency (or Freq. per shelf) Continuous Generator —15, 500186 required.

— Frequency Marking, (Multi-Freq.) —15, 500186 and 4W (extra matrix card) required.

— Coded (Single Freq.) —15, 500186 and 4W (extra matrix card) required.

— Superimposed (Single Freq.) —16, 500187 and 4W (extra matrix card) required.

— 3rd Digit TPL —21, 500196 ring Frequency selective by 3rd digit dialed.

#4 MATRIX CAGES — Order matrix cage dash number —23 through —25 as required when modules are equipped with matrix cards —33 through —47. Order matrix cage dash number —26 through —28 as required when modules are equipped with matrix cards —63 through —67 (—72 or —74 module configuration only).

#5 MATRIX CARDS — Order Matrix Cards as required for 3-wire or 4-wire systems per number of terminals needed (4th wire is required for Selective Ringing only).

A. Order Matrix Cards —33 through —37 for quantity of terminals required.

B. Order Matrix Cards —43 through —47 for quantity of terminals required. Matrix Cards 600140, 600141 and 600142 provide circuits for two separate groups of up to 5 connectors each. This allows a single overflow connector module to be installed to accommodate two separate connector groups. Available only in —72 or —74 (10 connector) module configuration.

C. Order Matrix Cards —64 through —67 for quantity of terminals required when the module is to be equipped with a maximum of five connectors. Available only in —72 or —74 (10 connector) module configuration.

NOTE: Order Terminal Blocks and Connectorized Cable as requird. See next page for listings.

EXAMPLE

Note Number	#1	#2	#3	#4	#5
Basic Module and Dash Number	800030 —72, —74, or —77	—10	—11 —14	—23	—33

EMS CABLES
CONNECTOR, OGT, MDF

ORDERING INFORMATION	
Female Connector One End (Tinned)	**Female Connector Both Ends**
651025, 1 ea. 25 Feet, 25 Pair 651050, 1 ea. 50 Feet, 25 Pair 651075, 1 ea. 75 Feet, 25 Pair 651100, 1 ea. 100 Feet, 25 Pair 651125, 1 ea. 125 Feet, 25 Pair 651150, 1 ea. 150 Feet, 25 Pair 651200, 1 ea. 200 Feet, 25 Pair	652025, 1 ea. 25 Feet, 25 Pair 652050, 1 ea. 50 Feet, 25 Pair 652075, 1 ea. 75 Feet, 25 Pair 652100, 1 ea. 100 Feet, 25 Pair 652125, 1 ea. 125 Feet, 25 Pair 652150, 1 ea. 150 Feet, 25 Pair 652200, 1 ea. 200 Feet, 25 Pair

NOTES

OGT — Order one Cable per #800030 Connector Module to Selector OGT Blocks as required (T,R,S for 3-Wire, or T,R,S,4W for 4-Wire).

MDF — Order two Cables per Matrix Card (32 Terminals) to MDF as required (T,R,S,4W).

GENERAL — Where overflow modules are used to meet high traffic requirements, order MDF Cables as specified above for the primary Module only. Order one #652004 and one #652005 Cable for each Matrix Card in the overflow Module(s).

TERMINAL BLOCKS
CONNECTOR, MDF

ORDERING INFORMATION	
#1 Connector Terminal Single Frequency	**#2 Connector Terminal Frequency Mark**
100245, 1 ea. 6 x 26 Wire Wrap 100244, 1 ea. 6 x 48 Connectorized	100247, 1 ea. 8 x 26 Wire Wrap 100246, 1 ea. 8 x 48 Connectorized
#3 Bay Supervisory Block	
500038, Supervisory Block Assembly	

NOTES

#1 CONNECTOR TERMINALS, SINGLE FREQUENCY — Order four each 100245 (6 x 26 Wire Wrap Blocks) or two each 100244 (6 x 48 Connectorized Blocks) for each Module (96 Terminals T,R,S per Connector Terminal, T,R,S for intercept access and separate plug for ANI sleeves).

#2 CONNECTOR TERMINALS, FREQUENCY MARK — Order four each 100247 (8 x 26 Wire Wrap Blocks) or two each 100246 (8 x 48 Connectorized Blocks) for each Module (96 Terminals T,R,S, 4W per Connector Terminal, T,R,S for intercept access and FM and separate plug for ANI sleeves).

#3 Order 1 per bay when required for miscellaneous lead multiple.

#4 Terminal Blocks specified above are adjustable for 7, 7.5, or 8-inch mounting.

SYSTEM DIAGRAM

Ribbon Cable

Finder Cable
to IDF

ALLOTTER

LINEFINDER OVERFLOW MODULE

800012

1 to 10 Finder Circuits

TRANSFER

Ribbon Cable

Ribbon Cable

8 Mounting Spaces
14 inches

Matrix
Cables
to MDF

01-32 lines

33-64 lines

MATRIX

65-96 lines

Finder Cable
to IDF

ALLOTTER

PRIMARY LINE/

LINEFINDER MODULE

800010

01-32 lines

33-64 lines

MATRIX

65-96 lines

96 lines

14 Mounting Spaces
24.5 inches

EMS-1 MOUNTING INFORMATION

This chart provides mounting space requirements
for EMS Modules and associated equipment.

RELAY RACK HEIGHT	7'6"		9'0"		10"6"		11'6" & 11'8'	
Number of 1.75 Inch Mtg. Spaces	47		57		67		73	
Mounting Space Requirements	Rack Cap.	Spaces Used	Rack Cap.	Spaces Used	Rack Cap.	Spaces Used	Rack Cap.	Spaces Used
Line/Linefinder Module 14 Mtg. Spaces (24.50 In.)	3	42	4	56	4	56	5	70
Line/Linefinder Module E/W Overflow Shelf 22 Mtg. Spaces (38.5 In.)	2	44	2	44	3	66	3	66

Selector Module
  —23, Matrix Cage
      12 Mtg. Spaces (21 In.)
  —24, Matrix Cage
      13 Mtg. Spaces (22.75 In.)
  —25, Matrix Cage
      14 Mtg. Spaces (24.50 In.)
  —26, Matrix Cage
      16 Mtg. Spaces (28.00 In.)
	3
	
	3
	
	3
	
	2
		36
		
		39
		
		42
		
		32
			4
			
			4
			
			4
			
			3
				48
				
				52
				
				56
				
				48
					5
					
					5
					
					4
					
					4
						60
						
						65
						
						56
						
						64
							6
							
							5
							
							5
							
							4
								72
								
								65
								
								70
								
								64

Preselector Module (Standard)
  —23, Matrix Cage
      18 Mtg. Spaces (14 In.)
  —24, Matrix Cage
      9 Mtg. Spaces (15.75 In.)
	5
	
	5
		40
		
		45
			7
			
			6
				56
				
				54
					8
					
					7
						64
						
						63
							9
							
							8
								72
								
								72

Connector Module
  —23, Matrix Cage
      10 Mtg. Spaces (17.50 In.)
  —24, Matrix Cage
      11 Mtg. Spaces (19.25 In.)
  —25, Matrix Cage
      12 Mtg. Spaces (21.00 In.)
	4
	
	4
	
	3
		40
		
		44
		
		36
			5
			
			5
			
			4
				50
				
				55
				
				48
					6
					
					6
					
					5
						60
						
						66
						
						60
							7
							
							6
							
							6
								70
								
								66
								
								72

DTA Assembly 5 Mtg. Spaces (8.75 In.)	8	40	10	50	13	65	14	70
OGT Block 3 Mtg. Spaces (5.25 In.)	—	3	—	3	—	3	—	3
600149 Filtered Fuse Panel 1 Mtg. Space (1.75 In.)	—	1	—	1	—	1	—	1

Standard EMS Modules are configured for mounting in 23 inch relay racks.

EMS-1, SPARES

The items listed below are recommended as minimum Spares for the number of EMS Lines indicated. Spares are not provided as kits, therefore, should be selected on an individual basis, as required.

SPARES RECOMMENDATION				
Number of Lines	0—192	193—480	481—960	961—UP
600105 Matrix Card 27"	1	1	2	2
600100 Matrix Card 23"	1	1	2	2
600110/600111 Line Circuit	1	2	3	4
600114 Transfer Circuit	1	1	1	2
600115/600117 Allotter Circuit	1	2	2	3
600116 Finder	1	2	2	3
600120/600122 Selector	1	2	4	5
600129/600123 Selector Test/T&P Ckt.	0	0	1	1
600130 Connector	1	2	3	4
600138 PBX Control Card	1	1	2	2
600139 Connector Test	1	1	1	1
¼ Amp. GMT Fuse	10	10	20	20
½ Amp. GMT Fuse	10	10	20	30
⅜ Amp. GMT Fuse	10	20	30	30
1 Amp. GMT Fuse	10	10	20	30
2 Amp. GMT Fuse	10	10	10	20
3 Amp. GMT Fuse	10	10	10	10
5 Amp. GMT Fuse	10	20	30	30
500205-01 Ribbon Cable	2	2	2	4
500205-02 Ribbon Cable	2	2	2	4
500205-03 Ribbon Cable	0	0	2	4
500201-0 RibbonCable	1	1	1	2

TYPICAL BUSY HOUR POWER REQUIREMENTS
(Based on 1.8 UC per line)

CIRCUIT DESCRIPTION	OFFICE SIZE					
	96L/ 96T	480L/ 480T	960L/ 960T	1536L/ 1536T	2016L/ 2016T	2976L/ 2976T
EMS Line/Linefinder Module (Including Matrix)	1A	5A	10A	16A	21A	31A
EMS Selector Module (Including Matrix)	.8A	4A	8A	15A	20A	28A
EMS Connector Module (Including Matrix)	1.5A	7.5A	15A	22A	30A	43A
TOTAL EMS	3.3A	16.5A	33A	53A	71A	102A
25 Watt Ringing Generator	1A	2A	2A	2A	3A	3A
Supervisory & Misc.	1A	2A	2.5A	3A	3A	3A
Trunks @ 125 mA per Trunk Average	2A	5A	7A	9A	14A	20A
Identifier (ANI)	2A	3A	3A	3A	4A	4A
TOTAL AMPS	9.3A	28.5A	47.5A	70A	95A	132A

The above typical requirements do not include other customer provided equipment.