TYPICAL RESTORATION OPTIONS

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Exhibits (Contd)

1. GENERAL

1.01 This appendix supplements Section 002-503-902PT. It provides offices with some typical restoration interconnecting options.

1.02 It is reissued to:

- Provide a table of contents to aid the user with a quick access point
- Reformat the exhibits for consistency
- Update some of the abbreviations to reflect current AT&T and Pacific Company standard abbreviations
- Include the appropriate legend on Page 1 in accordance with AT&Ts Guidelines and Procedures for Safeguarding Proprietary Information and Pacific Company's System Instruction (SI) 178.

Note: Marginal arrows used to denote changes are omitted.

1.03 The exhibits in this appendix should be used as references when developing restoration plans. They are provided for reference purposes only.

2. TD MULTIMASTER GROUP CONSIDERATIONS

2.01 The expansion of TD-2 radio facilities beyond 600 channels requires conversion to a three master group-type system. In addition, the different system loads (600 — 900 — 1020 / 1200/ 1500/1800 channels) require changes in the wire line entrance link gain and preemphasis arrangements.

2.02 Initially two master group expansions were accomplished by using MMX-1 master group stocking equipment obtained from the L-3 terminal arrangement. The multimaster group line signal of this type system is compatible with that of the L-3 System. Later systems using MMX-2 master group equipment which uses a different modulation arrangement which is not compatible with the MMX-1. Restoration activities must always take into consideration the type of MMX equipment on the system being restored.

2.03 Master group connectors are used more extensively with the expanded systems. Each master group of an expanded MUR can connect to either an LMX terminal or a MG connector. Either type of connection should be considered a terminal for restoration purposes. Office equipment arrangements should allow for the application of 560 kHz continuity tone at all MG connector points. Restoration plans should be prepared on a terminal-to-terminal basis for each MUR regardless of how the system derives its load.

2.04 In general, efforts should be made by the Pacific Area Regional Operations Control Center (PAROCC) to keep the restoration of these systems restricted to the use of radio protection facilities. This will keep all work operations as simple as possible and eliminate the need for anyone except terminals having to know the type transmission being used by the system. (Terminals should always transmit the same signal on the restoration layout as is being used on the regular layout.) When it becomes necessary to use something other than radio protection facilities, the PAROCC must see that the plan defines the normal transmission of the system and the types of modulation conversions needed along the restoration layout.

2.05 Attached are drawings that cover the typical terminal work operations needed at various types of offices.

3. L-4 RESTORATION CONSIDERATIONS

3.01 Restoration access to the L-4 System is provided by connections to a "Restoration Patch Bay" as used for other types of coaxial carrier systems. L-4 protection lines and spare master group equipment is available to the restoration patch bay so it can be utilized in the restoration of other types of systems. L-4 offices presently containing a patch bay should have the new L-4 patch bay installed closely to the existing one. Other offices should be equipped with a standard patch bay installation at the time L-4 terminals are installed.

3.02 The restoration access points in the L-4 equipment have been incorporated into the initial system design by the Bell Laboratories Engineers. A common level of -29 dBm has been established for all restoration patch bay appearances.

3.03 In addition to having a wider bandpass than any other type of line facility, the L-4 line also uses a different master group stacking configuration. All interexchanges between different types of systems during the restoration process must be done by restacking the master groups as needed by each type facility being used. It also dictates that the L-4 services be restored on an individual master group (terminal-to-terminal or terminal-to-MG connector) basis in most cases. Any type of L-4 line re-entry requires that the six master groups be carefully restacked so that they conform to the layout passing the particular point.

TABLE A

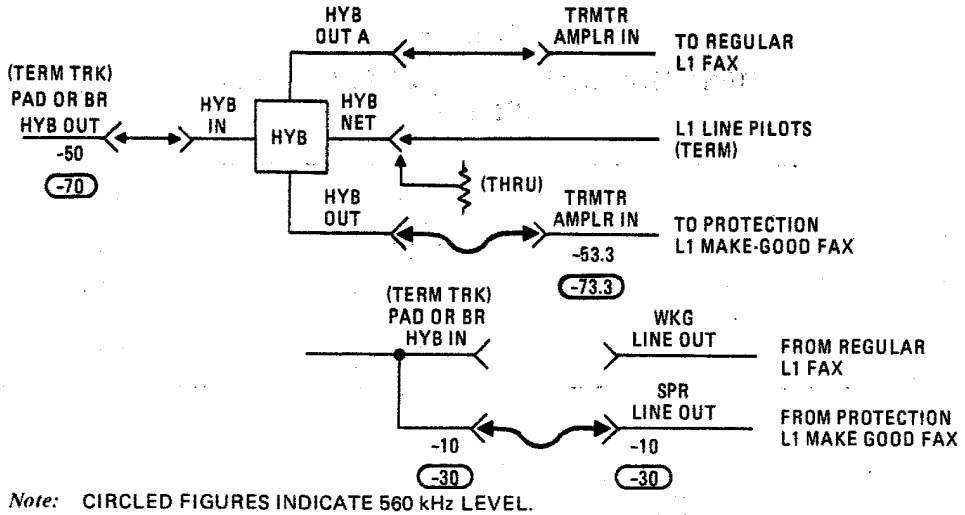
RESTORATION LEVEL CHECK POINTS
TRANSMIT

		CH TONE	64 KHz	AUTO 560KHz
L1				
TRMT TERM TRK OUT		–50	DNA	–70
LINE HYB OUT		–53.3	–57.3	–73.3
TRMT AMPL OUT		–17	–14	–38
L3				
TRMT TERM OUT	MG1	–48.3		–68
	MG2	–43.3		–63
	MG3	–38.3		–58
TRMT HYB OUT	MG1	–55.0		–75
	MG2	–50.0		–70
	MG3	–45.0		–65
FLAT AMPL T OUT	MG1	–21.0		–41
	MG2	–16.0		–36
	MG3	–11.0		–31
L4				
TERM TRK OUT (ALL MGs)		–40.0		–60.0
TST TRMTG (ALL MGs)		–45.0		–65.0
TD–2				
TRMT TERM TRK OUT		–50	DNA	–70
TRMT HYB OUT		–53.3	–67.3	–73.3
FMT IN (NO MG EQPT USED)		–33 @ (1.4MHz)	–54.5	–57.8
TH OR L3 ON TD–2 FMT IN	MG1	–53.1		–73.1
	MG2	–48.4		–68.4
	MG3	–45.9		–65.9
TRMT HYB IN B (LMX BAY)		–43.4	DNA	–63.4
FLAT GAIN AMPL OUT		–13.3	–27.3	–33.3
TD–2-B				
TRMT TERM TRK OUT		–50.0	DNA	–70.0
TRMT HYB OUT		–53.3	–67.3	–73.3
FMT IN		–38 @ 3.2MHz	–58.3	–63.9
TH				
TRMT TERM OUT	MG1	–46.1	–64.5	–66.1
	MG2	–41.4	–64.5	–61.4
	MG3	–38.9	–64.5	–58.9
FMT IN	MG1	–30.7	–48.9	–50.7
	MG2	–26.0	–48.9	–46.0
	MG3	–23.5	–48.9	–43.5

TABLE B

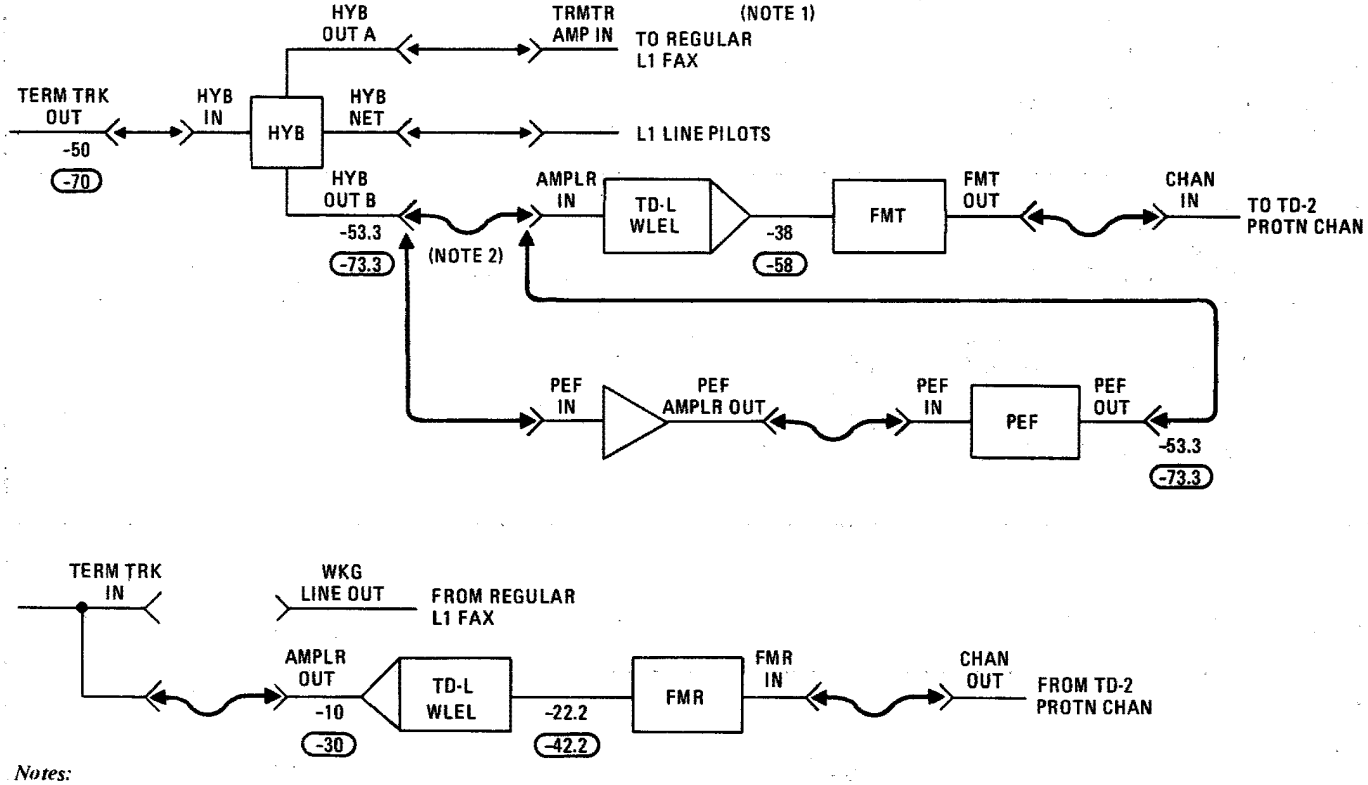
RESTORATION LEVEL CHECK POINTS
RECEIVE

		CH TONE	64 KHz	AUTO 560KHz
L1				
RCV AMPL OUT		–10	–14	–30
FG AMPL 1 OUT		–10	–14	–30
SP LINE OUT		–10	–14	–30
RCV TERM TRK OUT		–18	–22	–38
L3				
RCV TERM IN	MG1	–24.4		–44.4
	MG2	–19.4		–39.4
	MG3	–14.4		–34.4
HYB OUT	MG1	–21.0		–41.0
	MG2	–16.0		–36.0
	MG3	–11.0		–31.0
L4				
LINE OUT (ALL MGs)		–23.1		–43.1
RSTN TRK OUT (ALL MGs)		–23.1		–43.1
TD–2				
FMR OUT (NO MG EQPT USED)		–17.0 @ (1.4MHz)	–38.5	–41.8
WLEL OUT		–10	–24	–30
RCV TERM TRK OUT (LMX BAY)		–18	–32	–38
TH OR L3 ON TD–2 FMR OUT	MG1	–37.1		–57.1
	MG2	–32.4		–52.4
	MG3	–29.9		–49.9
PRE AMPL "B" AUTO DETECTOR PANEL		–21.0		–41.0
TD–2-B				
FMR OUT		–22.0 @ 3.2MHz	–36.3	–41.9
TH				
FMR	MG1	–27.7	–40.9	–47.7
	MG2	–23.0	–40.9	–43.0
	MG3	–20.5	–40.9	–40.5
RCV TRK OUT	MG1	–24.5	–37.7	–44.5
	MG2	–19.8	–37.7	–39.8
	MG3	–17.3	–37.7	–37.3



Note: CIRCLED FIGURES INDICATE 560 kHz LEVEL.

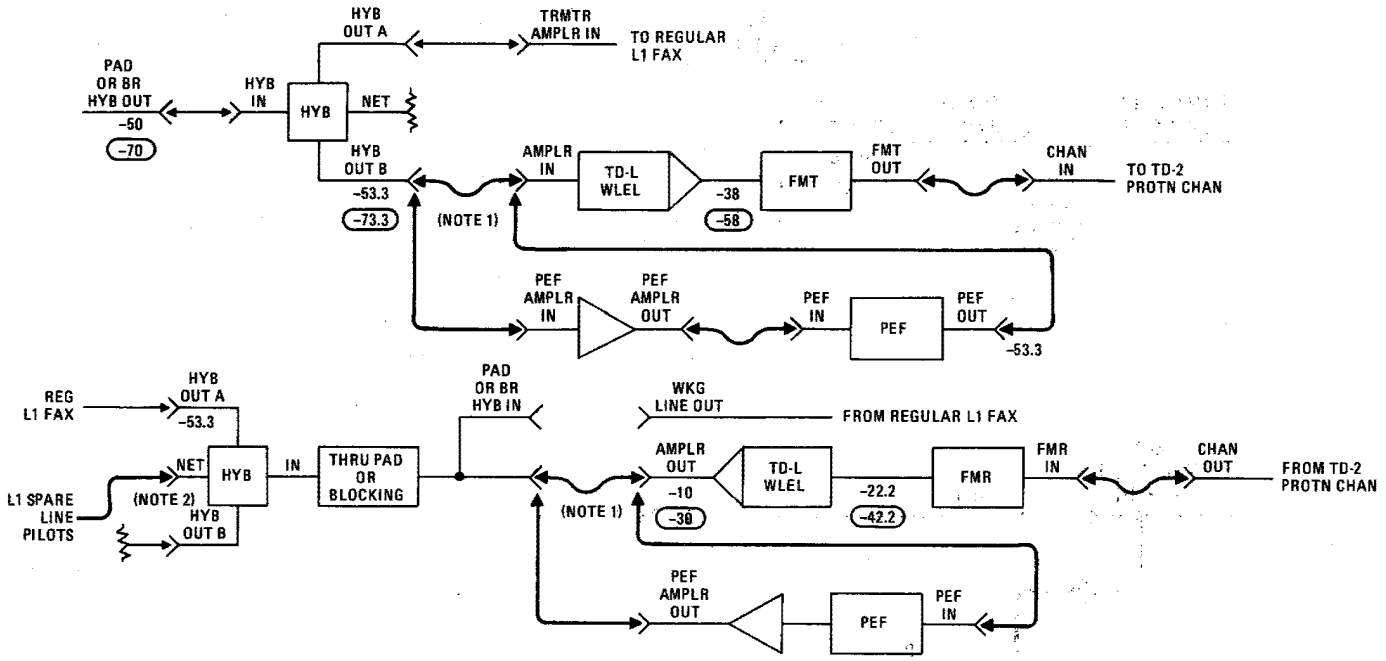
Patches to Make Good L1 Terminal or Through (COAX) on L1 Coaxials
Exhibit 1



Notes:

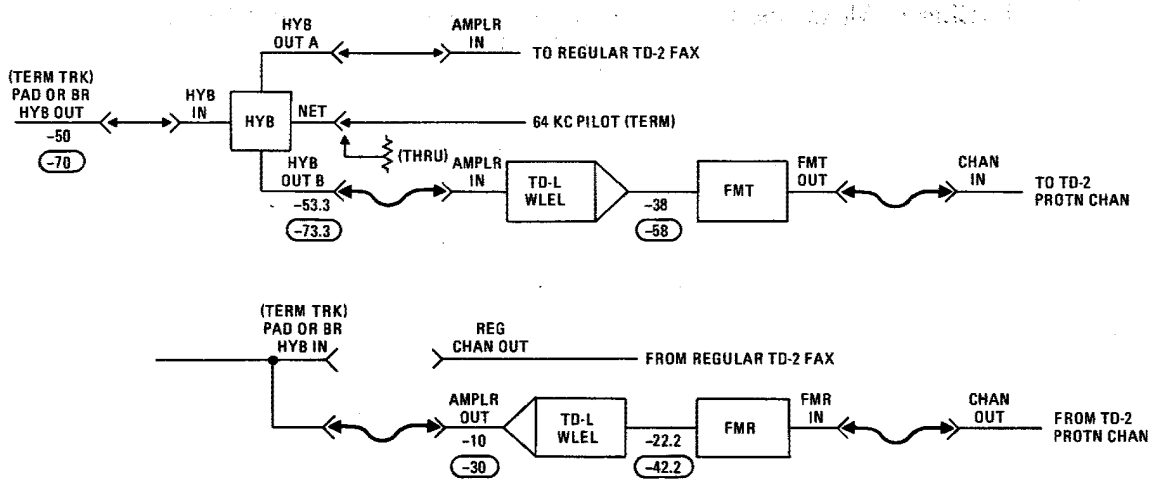
1. CIRCLED FIGURES INDICATE 560 kHz LEVEL.
2. USE PEF EQUIPMENT IF PILOTS ELIMINATION IS REQUIRED.

Patches to Make Good L1 Terminal (COAX) on TD-2 Channel
Exhibit 2



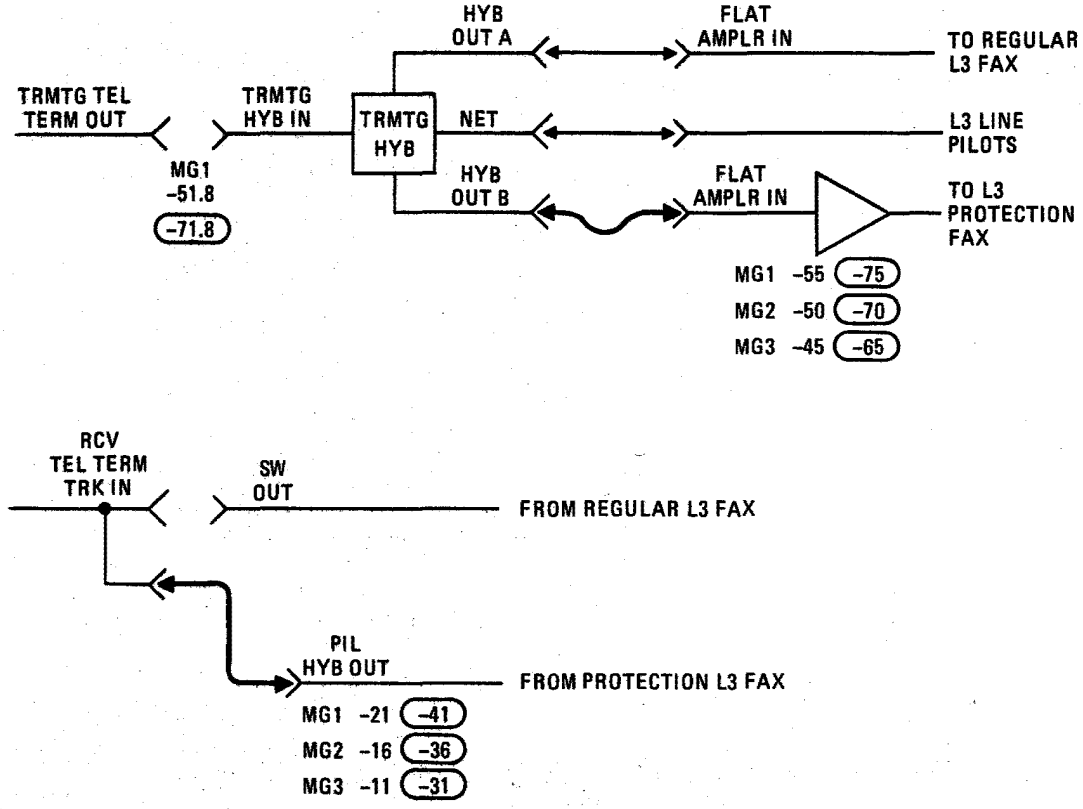
Notes:
1. USE PEF EQUIPMENT IF PILOT ELIMINATION IS REQUIRED.
2. PATCH HYB NET TO SPARE L1 PILOTS IF PILOT ELIMINATION FILTERS ARE USED OR IF L1 LINE PILOTS ARE NOT RECEIVED OVER MAKE-GOOD.
3. CIRCLED FIGURES INDICATE 560 kHz LEVEL.

Patches to Make Good L1 Through (COAX) on TD-2 Channel
Exhibit 3



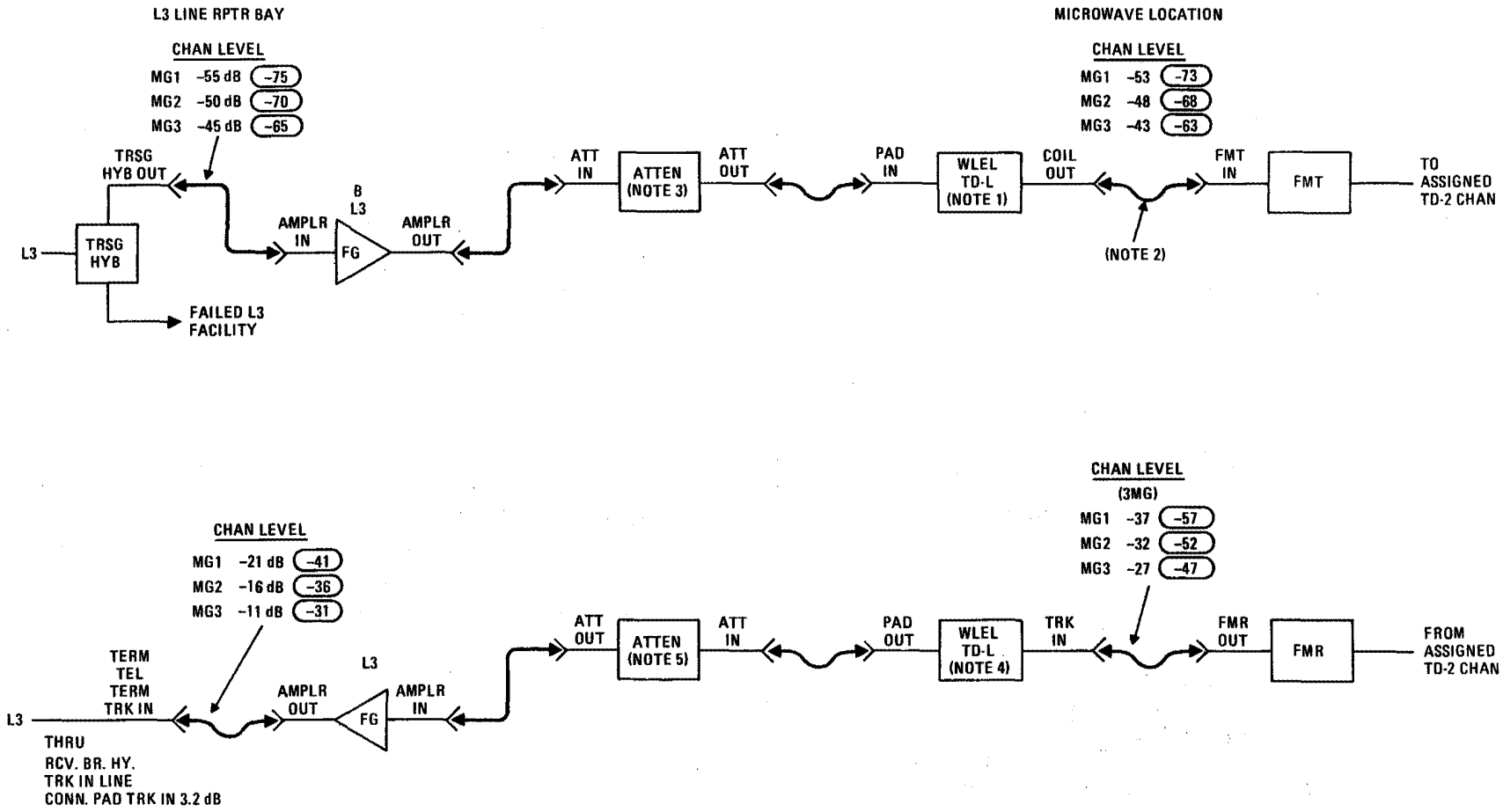
Note: CIRCLED FIGURES INDICATE 560 kHz LEVEL.

Patches to Make Good L1 Terminal or Through (TD-2) on TD-2 Channel
Exhibit 4



Note: CIRCLED FIGURES INDICATE 560 kHz LEVELS.

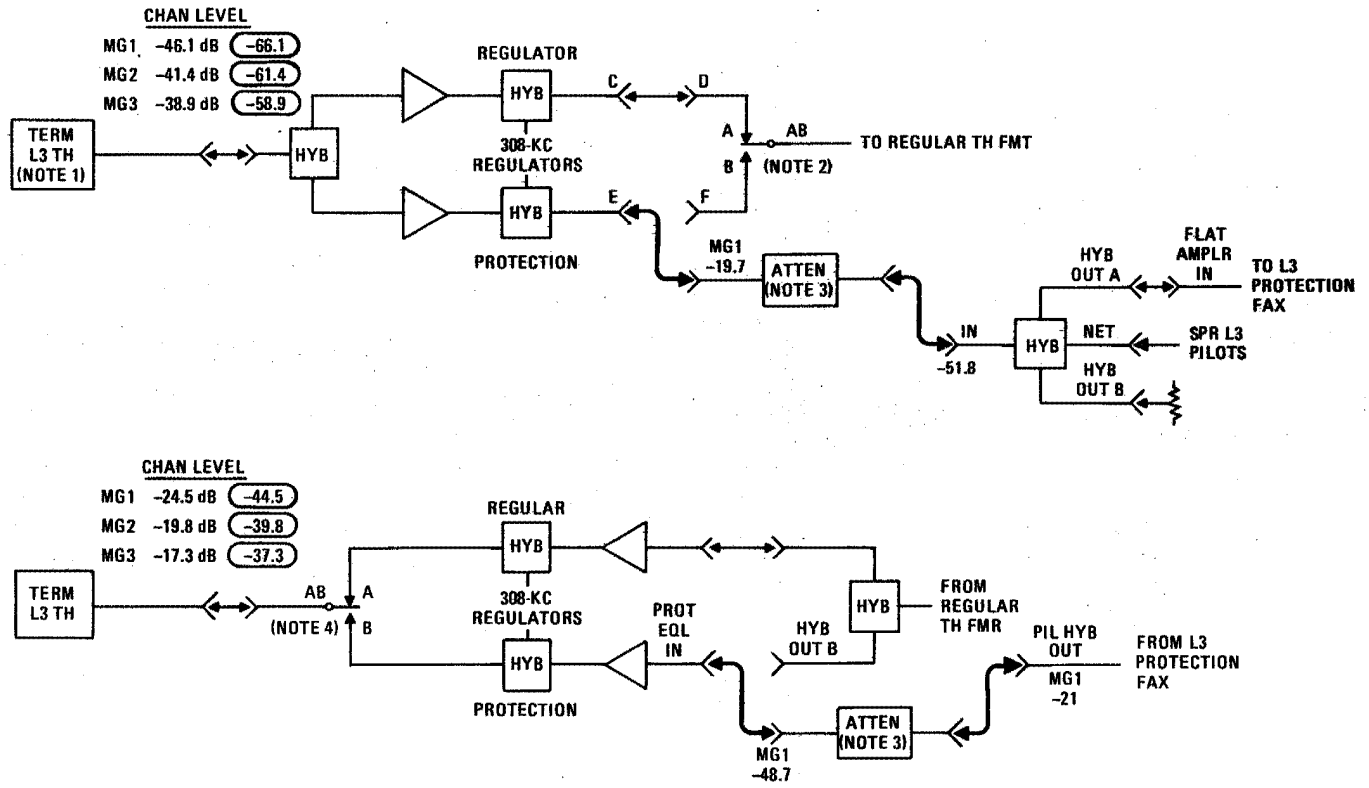
Patches to Make Good L3 Terminal or Through (COAX) on L3 Coaxials
Exhibit 5



Notes:

1. BYPASS 457A NET (PRE-EMPHASIS) AND L1 FG AMPLIFIER.
2. BYPASS NOISE FILTER (525R).
3. ADJUST ATTENUATOR TO OBTAIN CHAN LEVEL MG1 AT FMT.
4. BYPASS 457B NET (RESTORER) AND L1 FG AMPLIFIER.
5. ADJUST ATTENUATOR TO OBTAIN CHAN LEVEL MG1 AT AMPLR OUT.
6. CIRCLED FIGURES INDICATE 560 kHz LEVELS.

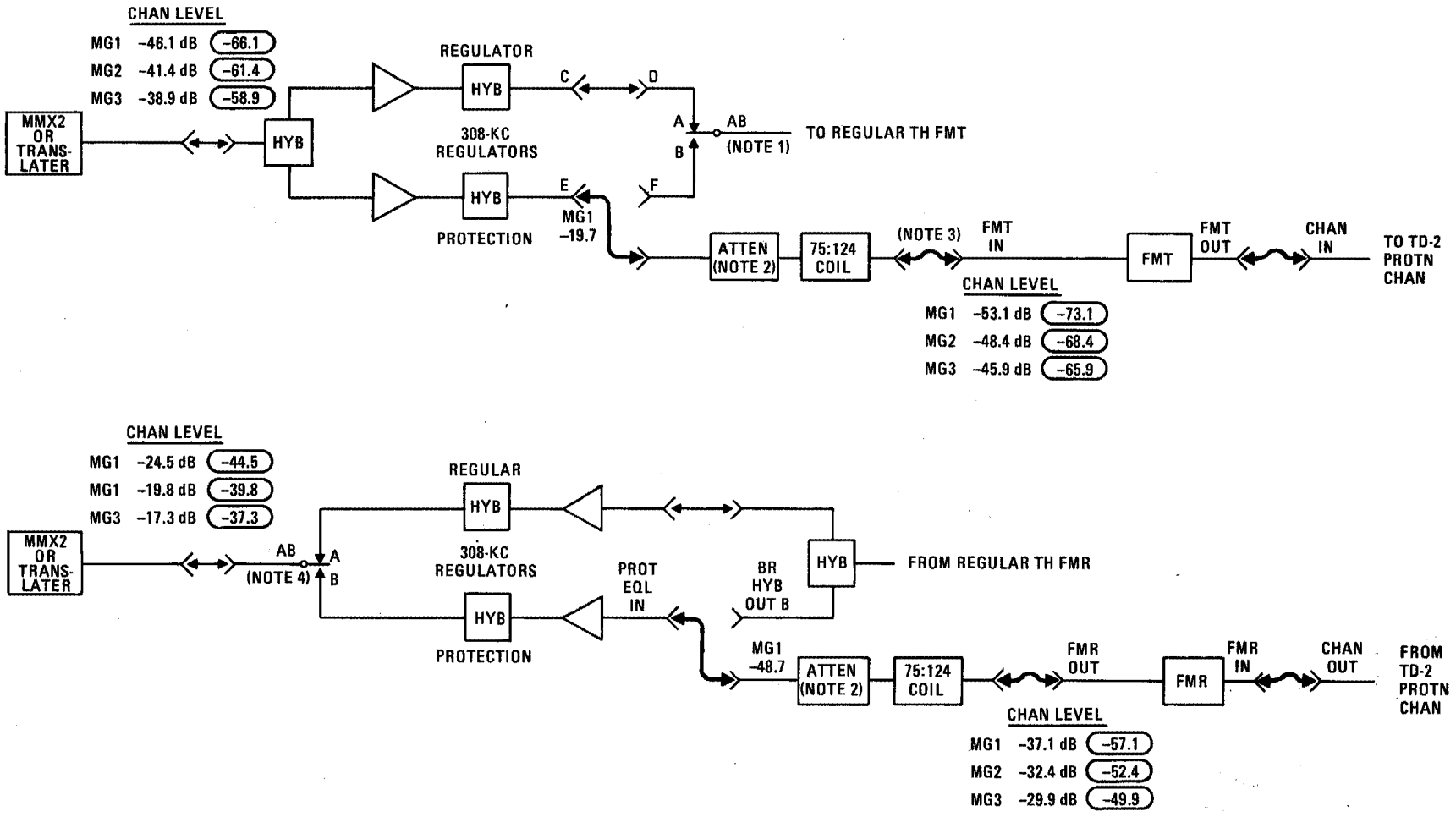
Patches to Make Good L3 Terminal (COAX) (Up to Three MG) on TD-2 Channel
Exhibit 6



Notes:

1. REMOVE 308 AND 8320 kHz PILOTS FROM TRANSMITTING TERMINAL.
2. LOCK SWITCH NORMAL.
3. ADJUST ATTENUATORS FOR PROPER LEVELS.
4. OPERATE SWITCH TO PROTECTION TO SWITCH SERVICE TO MAKE GOOD FACILITY.
5. CIRCLED FIGURES INDICATE 560 kHz LEVELS.

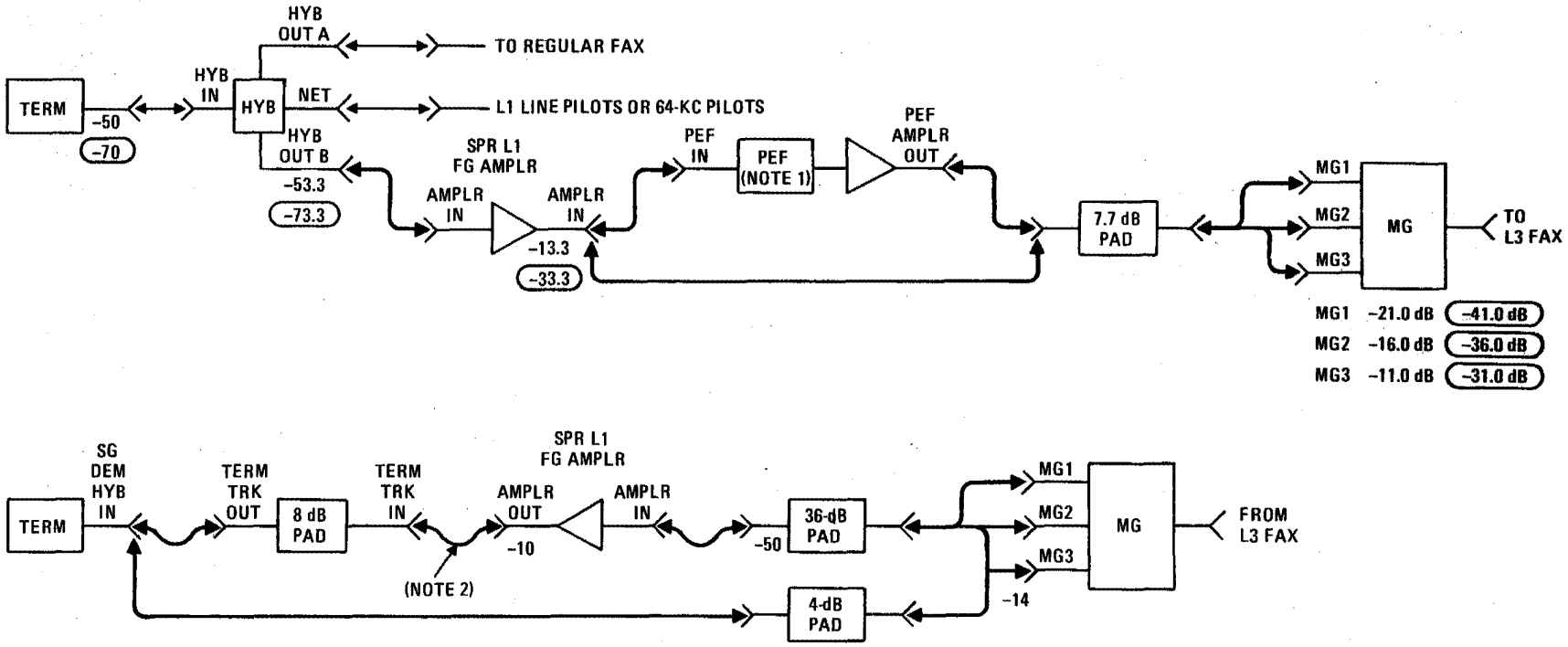
Patches to Make Good L3 Terminal (TH) on L3 Coaxials
Exhibit 7



Notes:

1. LOCK SWITCH NORMAL.
2. ADJUST ATTENUATORS FOR PROPER LEVELS.
3. BYPASS NOISE FILTER (525R).
4. OPERATE SWITCH TO PROTECTION TO SWITCH SERVICE TO MAKE GOOD FAX.
5. CIRCLED FIGURES INDICATE 560 kHz LEVELS.

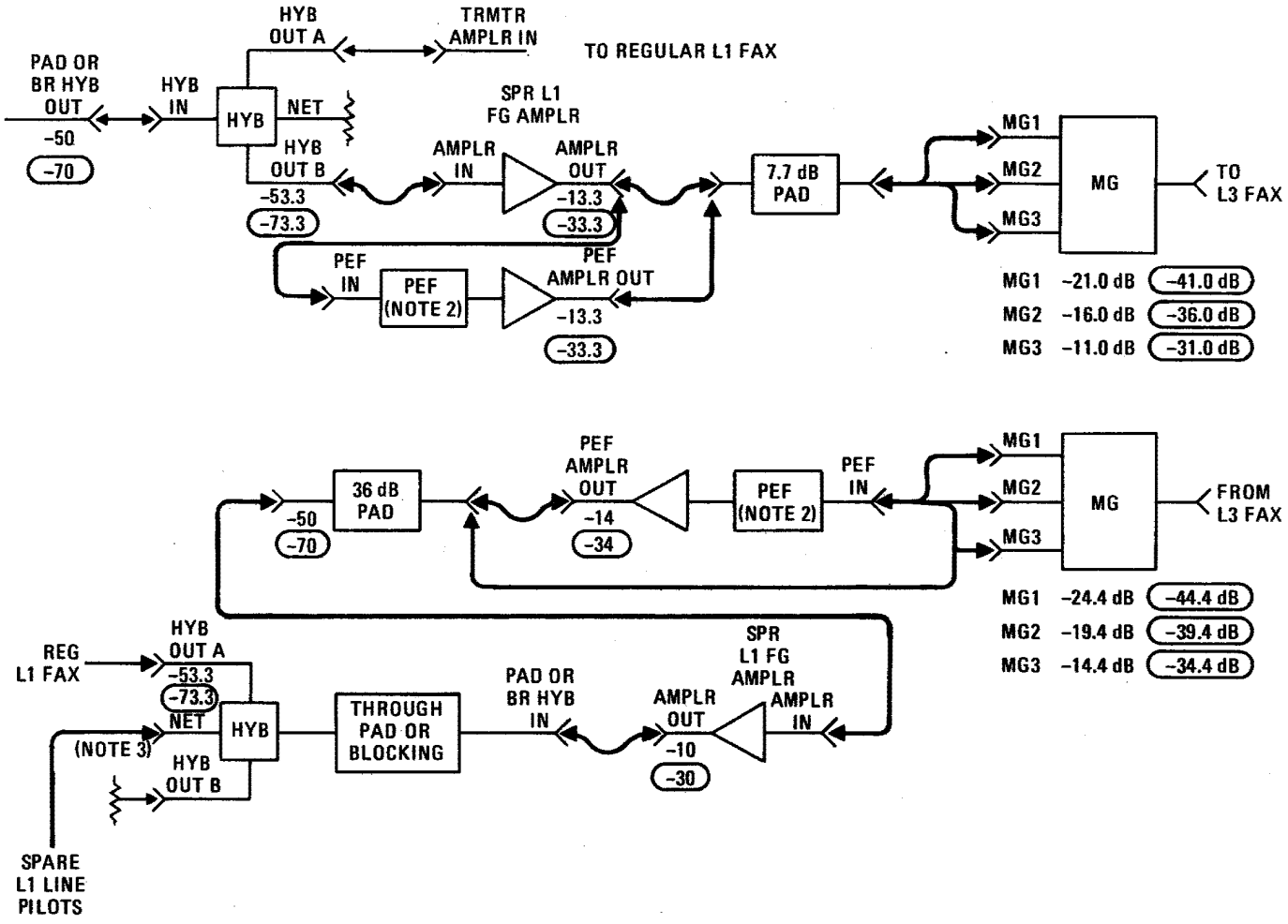
Patches to Make Good L3 Terminal (TH) on TD-2 Channel
Exhibit 8



Notes:

1. USE PEF WHEN PATCHING TO MG1 OR 3 FROM COAX. TERMINAL.
2. USE 4-dB PAD TO SG DEM HYB IN IF SPARE FG AMP NOT AVAILABLE.
3. PATCH TO MG1 KILLS SG1 PATCH TO MG2 OR 3 KILLS SG1 AND SG2.
4. CIRCLED FIGURES INDICATE 560 kHz LEVELS.

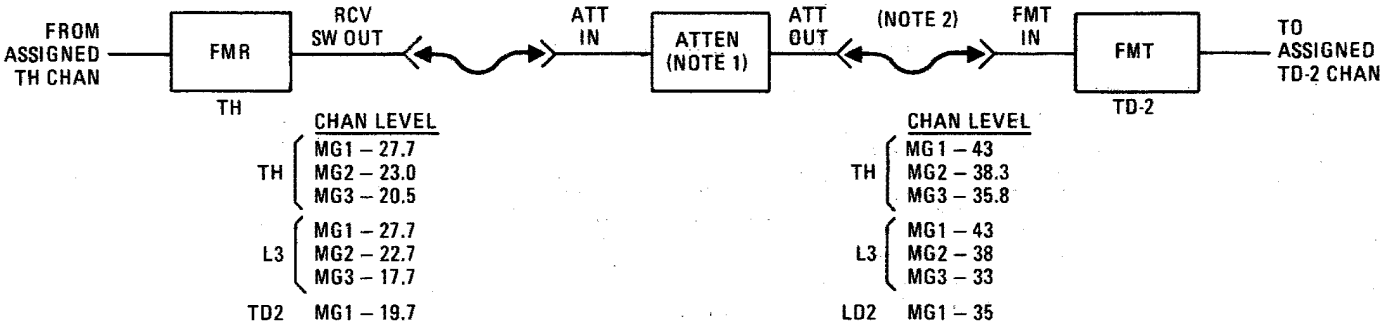
Patches to Make Good L1 Terminal (COAX or TD-2) on L3 Master Groups
Exhibit 9

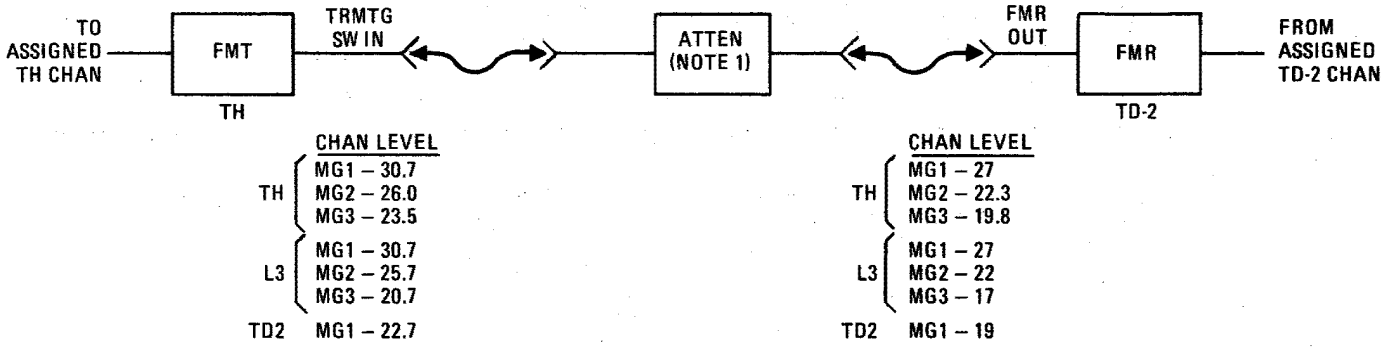


Notes:

1. PATCH TO MG1 KILLS SG1. PATCH TO MG2 OR 3 KILLS SG1 AND 2.
2. USE PEF WHEN PATCHING TO MG1 OR 3.
3. PATCH HYB NET TO SPARE L1 LINE PILOTS.
4. PATCH TO MG1 KILLS SG1. PATCH TO MG2 OR 3 KILLS SG1 AND 2.
5. CIRCLED FIGURES INDICATE 560 kHz LEVELS.

Patches to Make Good L1 Through or Branching (COAX) on L3 Master Groups
Exhibit 10



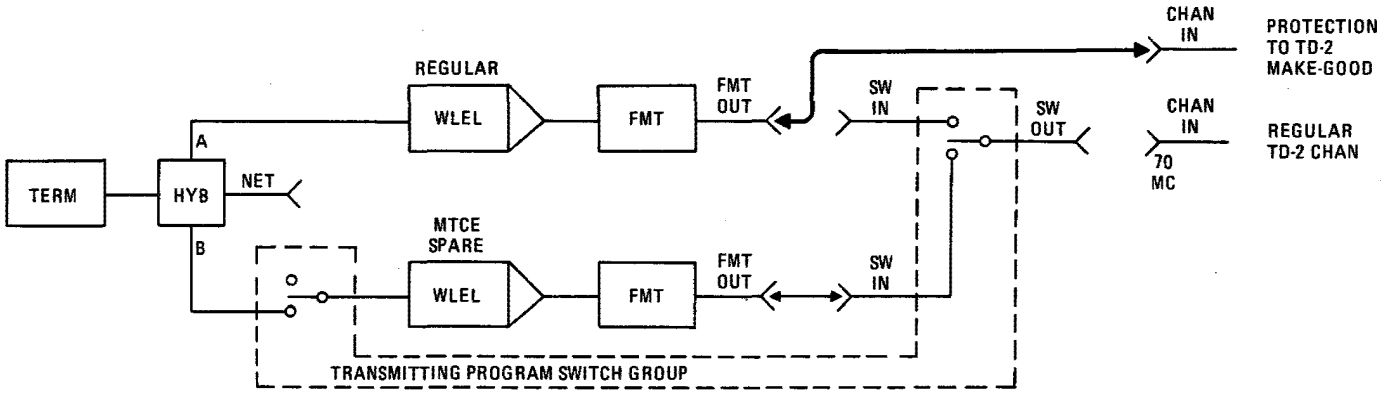


Notes:

1. ADJUST ATTENUATOR TO OBTAIN REQUIRED CHANNEL LEVEL AT FMTs.

2. BYPASS NOISE FILTER (525R).

Patches and Required Levels when Interconnecting a TD-2 Channel and a TH Channel
Exhibit 11

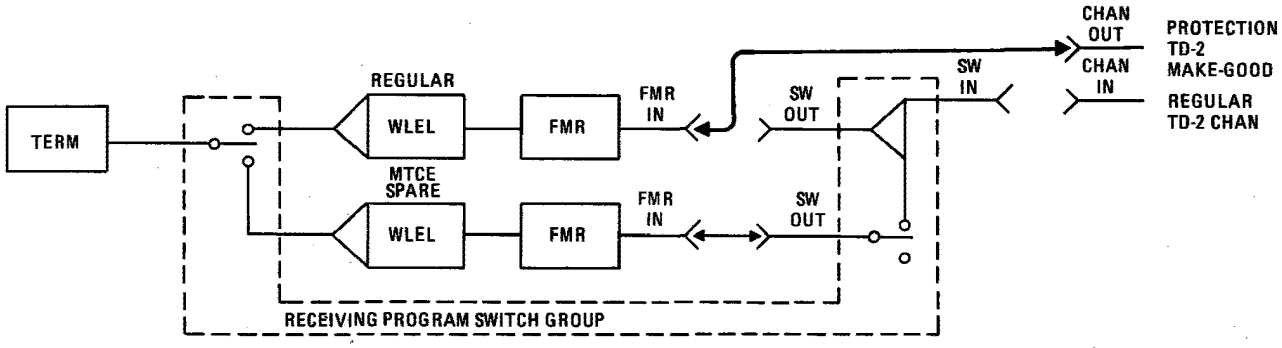


ESTABLISH

1. IF SERVICE STILL GOOD ON REGULAR FAX, SWITCH TO MTCE SPR WLEL & FMT.
2. PATCH REGULAR FMT OUT TO CHAN IN OF MAKE-GOOD.
3. VERIFY CONTINUITY AND HAVE RECEIVING TERMINAL TAKE SERVICE FROM MAKE-GOOD.
4. PATCH 70 MC SIGNAL TO CHAN IN OF REGULAR CHANNEL.
5. RESTORE MTCE SPR WLEL & FMT SWITCH.

GO REGULAR

1. SWITCH TO MTCE SPR WLEL & FMT.
2. REMOVE 70 MC AND RESTORE PATCH PLUG SW OUT – CHAN IN ON REGULAR CHAN.
3. VERIFY CONTINUITY AND HAVE RECEIVING TERMINAL TAKE SERVICE FROM REGULAR.
4. REMOVE PATCH REGULAR FMT OUT – MAKE CHAN IN RESTORE PATCH PLUG REGULAR FMT OUT – SW IN.
5. RESTORE MTC SPR WLEL & FMT SWITCH.



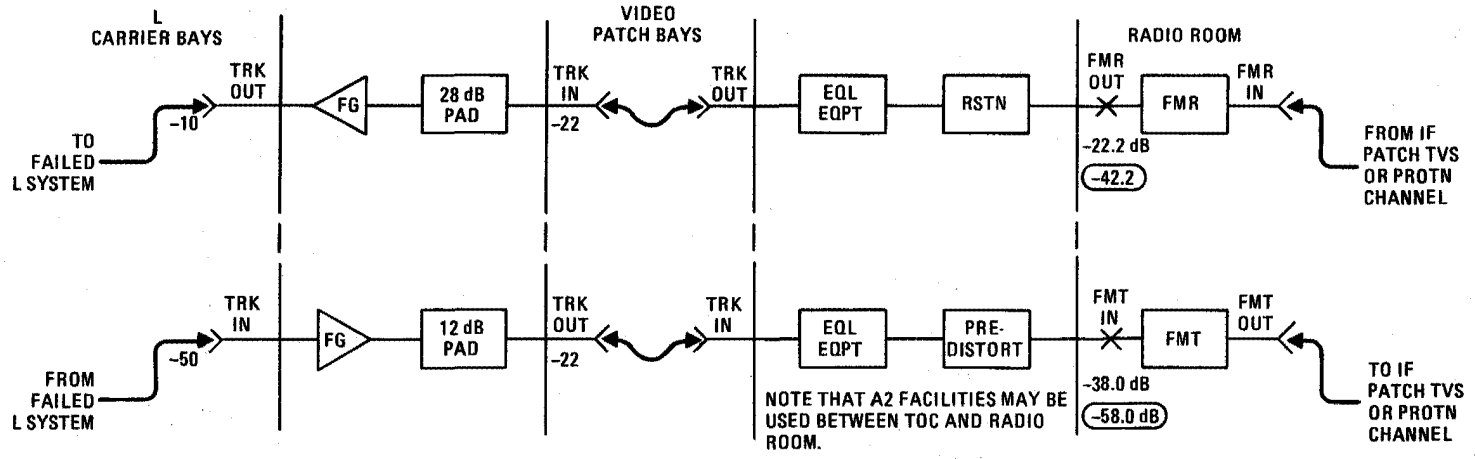
ESTABLISH

1. IF SERVICE STILL GOOD ON REGULAR, SWITCH TO MTCE SPR FMR & WLEL.
2. PATCH REGULAR FMR IN TO CHAN OUT OF MAKE-GOOD.
3. VERIFY CONTINUITY AND RESTORE MTCE SPR FMR & WLEL SWITCH.

GO REGULAR

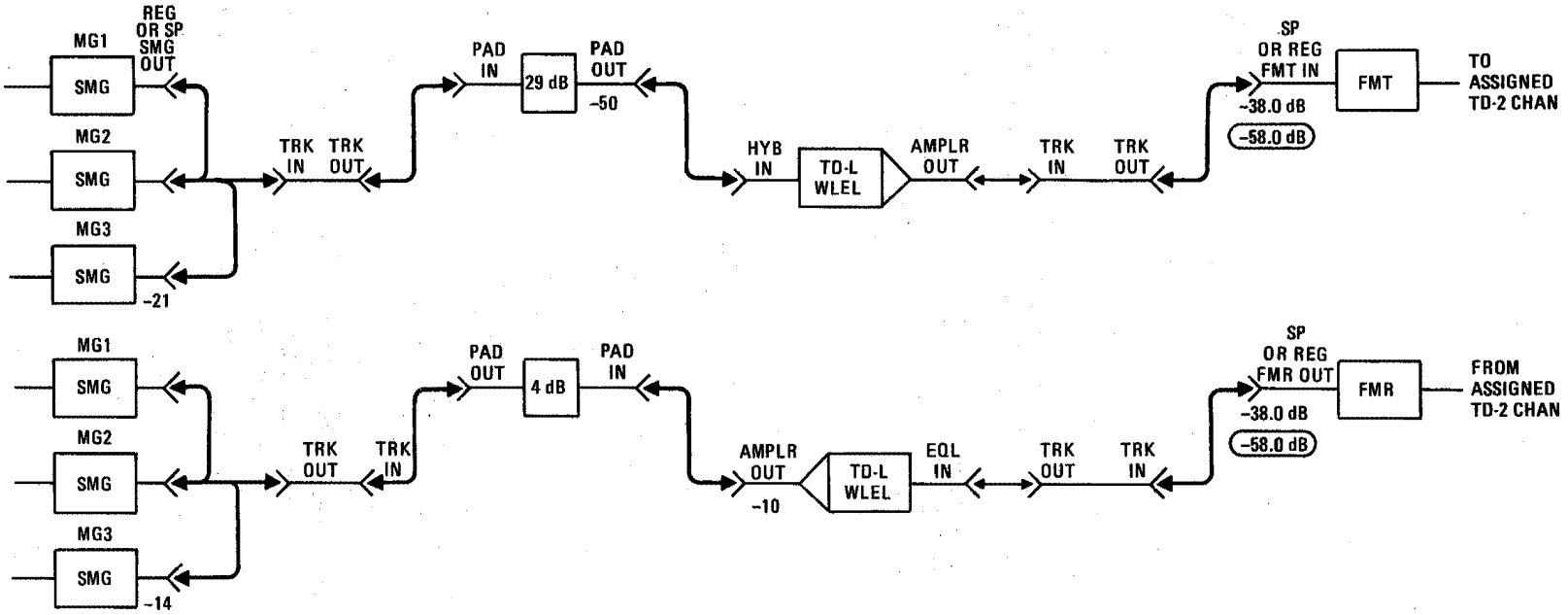
1. VERIFY REGULAR CHAN CONTINUITY.
2. SWITCH TO MTCE SPARE FMR & WLEL.
3. REMOVE PATCH MAKE-GOOD CHAN OUT – REGULAR FMR IN. RESTORE PATCH PLUG SW OUT – FMR IN.
4. RESTORE MTC SPR FMR & WLEL SWITCH.

Patches to Make Good L1 Terminal or Through (TD-2) on TD-2 using IF Patching
Exhibit 12



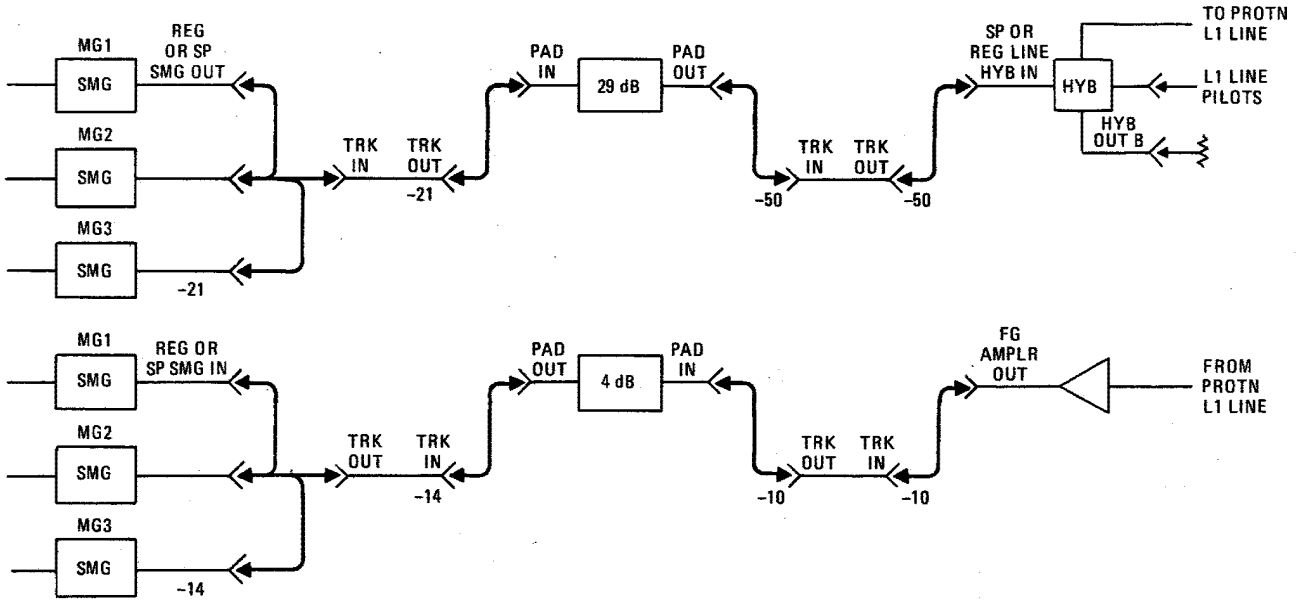
Note: CIRCLED FIGURES INDICATE 560 kHz LEVEL.

Broadband L Carrier Restoration Method Using TV Trunks TOC to Radio Room as WLELs
Exhibit 13

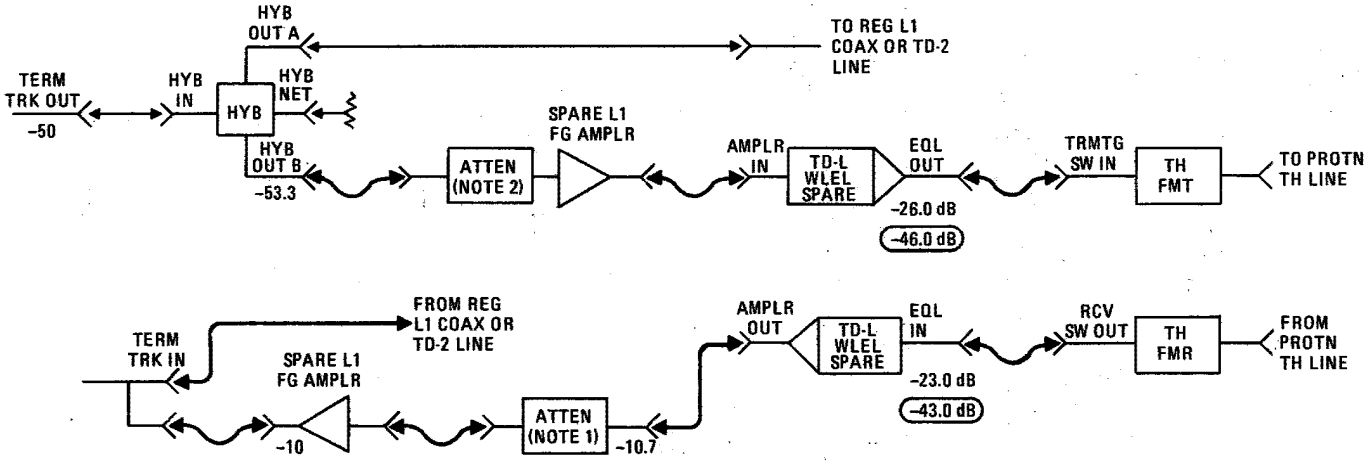


Note: CIRCLED FIGURES INDICATE 560 kHz LEVEL.

Patches to Make Good Only One L3 (Terminal) MG 1, 2, or 3 on One TD-2 Channel
Exhibit 14

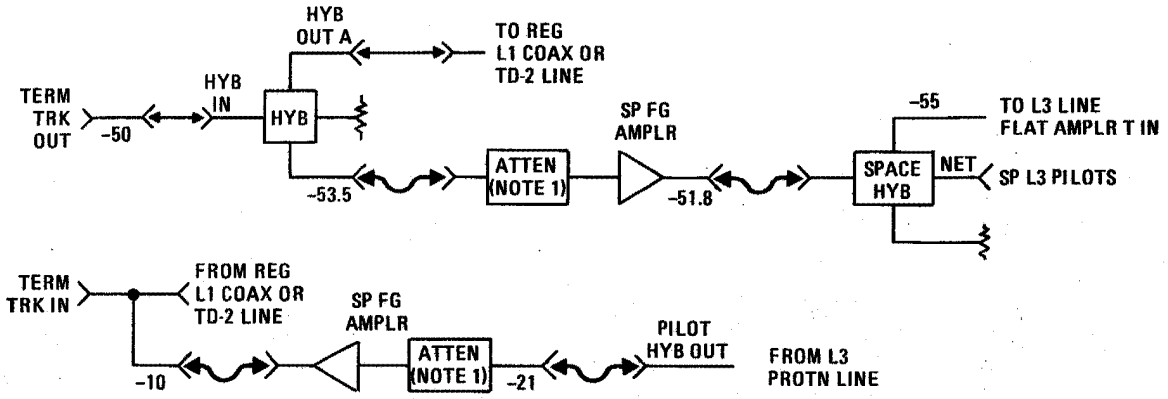


Patches to Make Good Only One L3 (Term) MG 1, 2, or 3 on One L1 COAX Line
Exhibit 15



Notes:
1. ADJUST ATTEN FOR -10 dBm AT TERM TRK IN.
2. ADJUST ATTEN TO OBTAIN REQUIRED LEVEL AT FMT.
3. CIRCLED FIGURES INDICATE 560 kHz LEVEL.

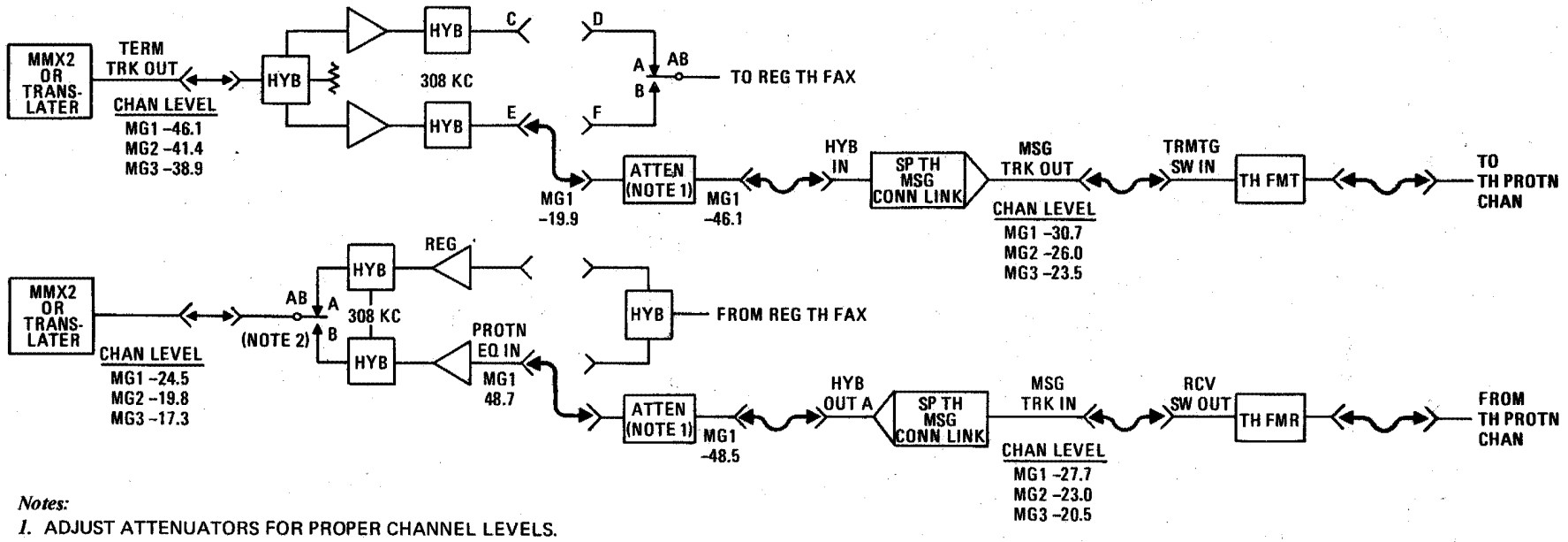
Patches to Make Good LMX (Terminal) on TH Radio (Without MG Equipment)
Exhibit 16



Notes:

1. ADJUST ATTENUATORS FOR PROPER CHANNEL LEVELS.
2. COAXIAL CABLE LOW-FREQUENCY ROLL-OFF KILLS PART SG1.

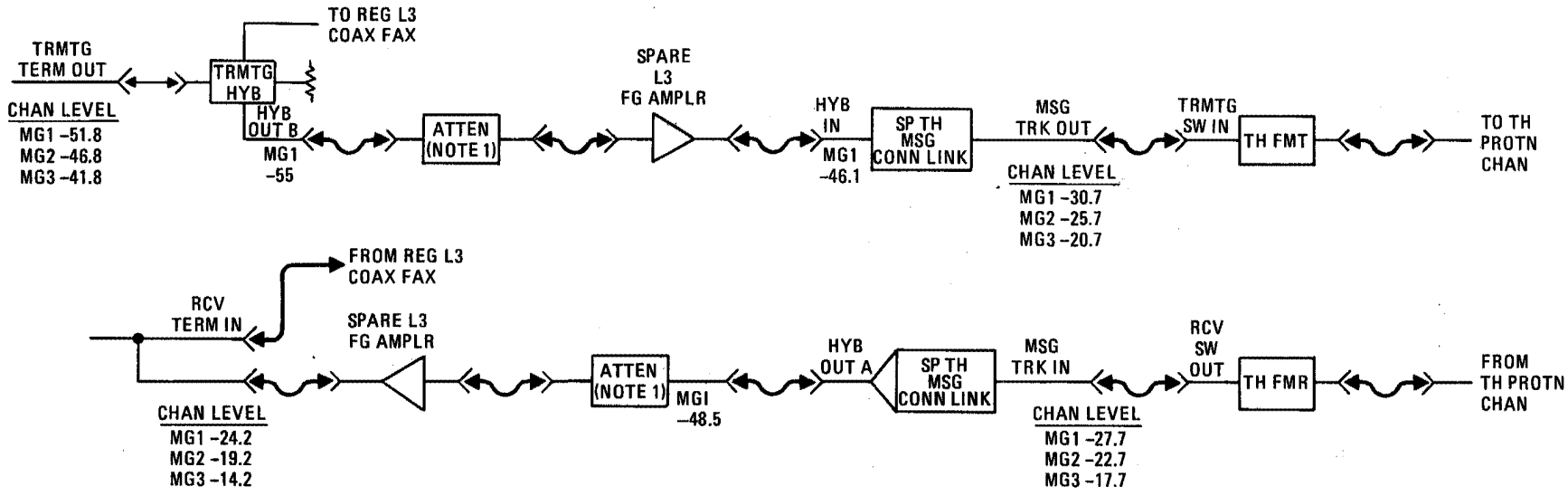
Patches to Make Good LMX Term on L3 COAX (Without MG Equipment)
Exhibit 17



Notes:

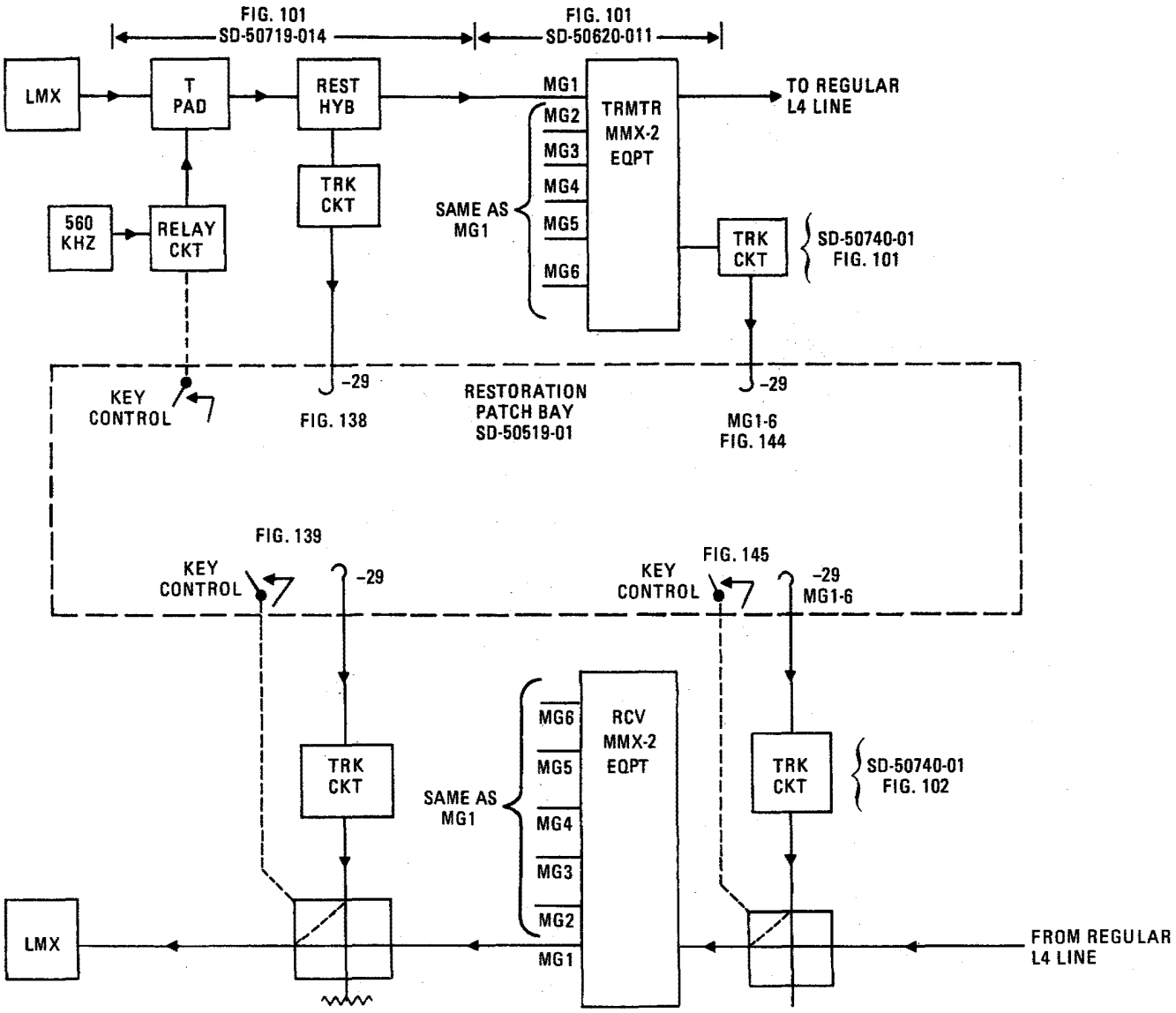
1. ADJUST ATTENUATORS FOR PROPER CHANNEL LEVELS.
2. OPERATE SWITCH TO PROTECTION TO SWITCH SERVICE TO PROTECTION CHANNEL.

Patches to Make Good L3 Terminal (TH) on TH Radio
Exhibit 18



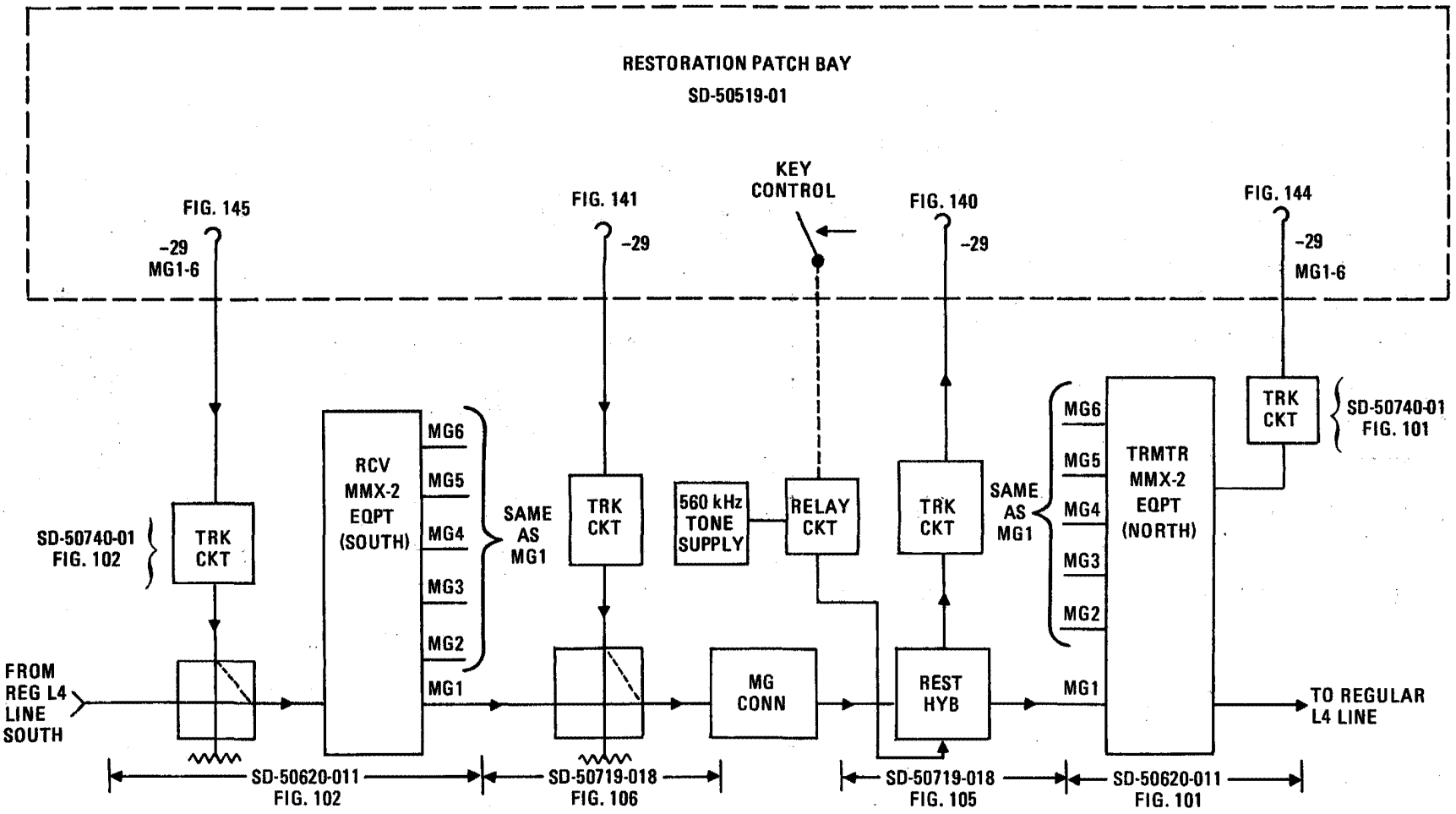
Note 1: ADJUST ATTENUATORS FOR PROPER CHANNEL LEVELS.

Patches to Make Good L3 Terminal COAX on TH Radio
Exhibit 19



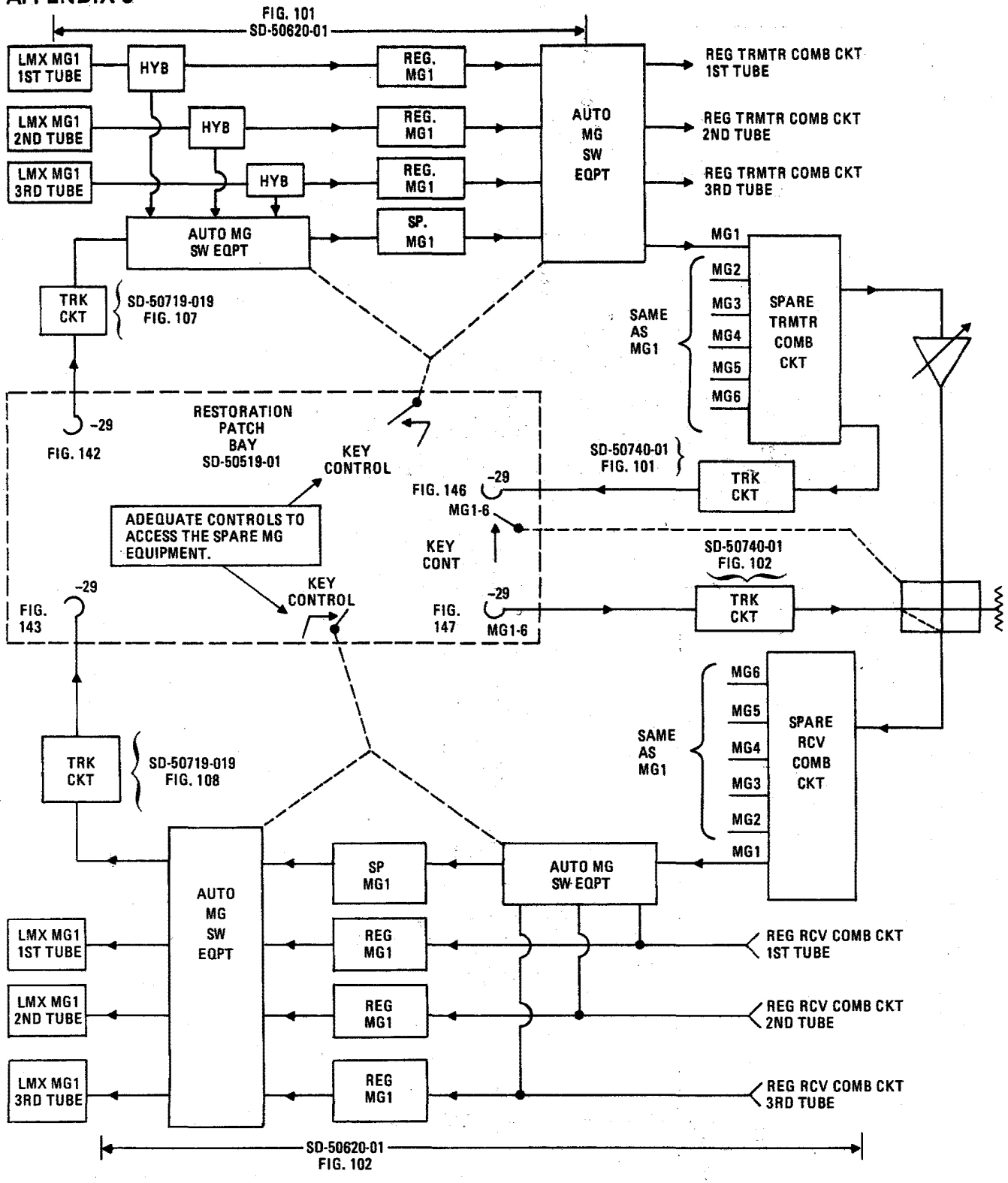
Note: BOTH DIRECTIONS OF A 6MG L-4 TERMINAL ARE SHOWN. A LEG OF EACH TRANSMITTING MG IS BROUGHT TO THE PATCH BAY AT A –29 dB LEVEL WITH A MEANS TO APPLY 560 kHz TONE TO EACH MG. A LEG FROM THE COMBINED MG OUTPUT OF THE MMX-2 EQUIPMENT IS ALSO BROUGHT OUT AT A –29 dB LEVEL. RECEIVING ACCESS TO THE SAME POINTS IS FURNISHED AT –29 dB LEVELS USING 223-TYPE SWITCHES CONTROLLED FROM THE PATCH BAY. (SD DRAWING REFERENCES ARE LISTED.)

Restoration Options – Regular L4 Terminal
Exhibit 20



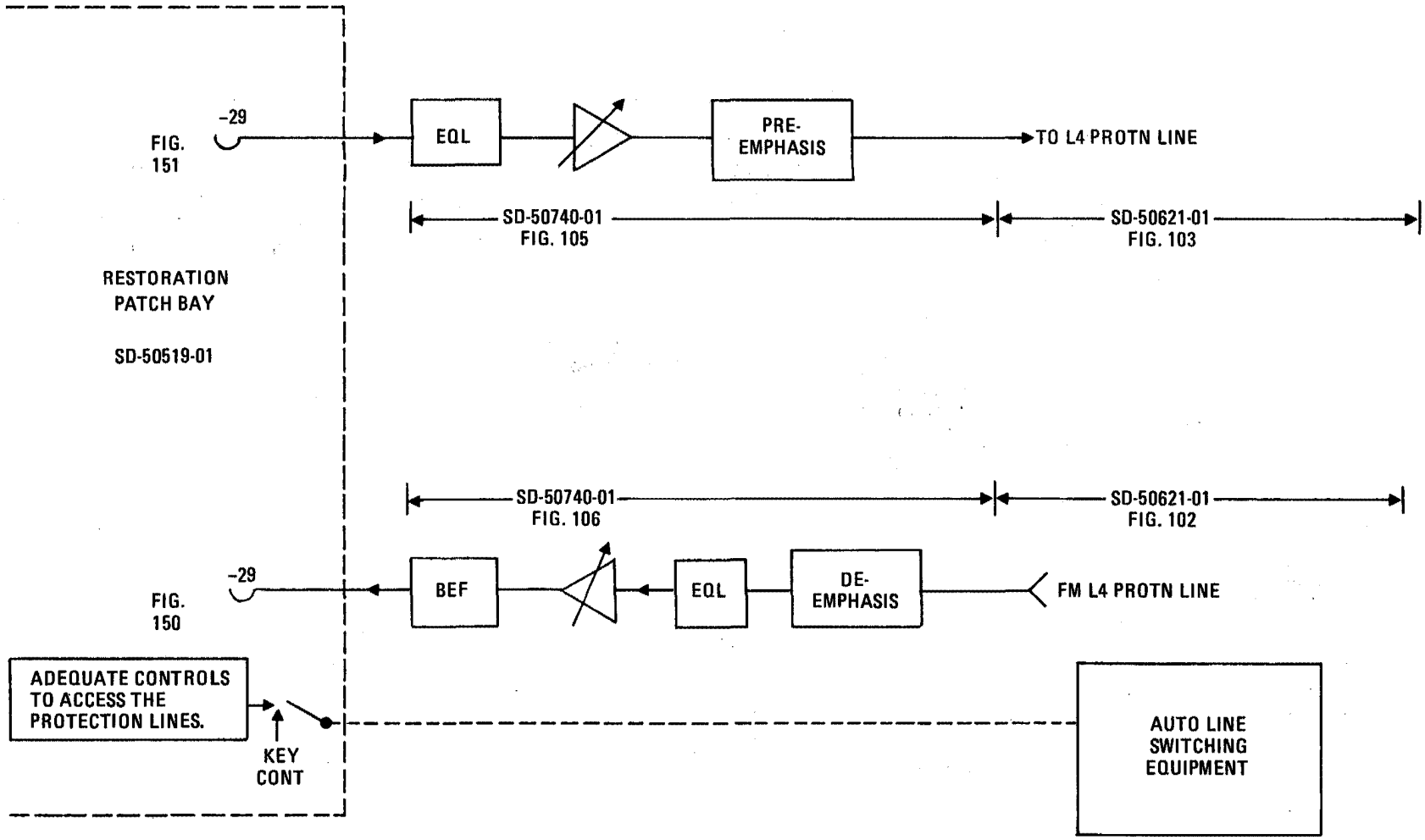
Note: ACCESS IS PROVIDED AT MG CONNECTOR POINTS AS SHOWN. ONLY ONE DIRECTION OF TRANSMISSION IS SHOWN IN THIS FIGURE BUT THE SAME IDENTICAL ARRANGEMENT IS USED IN THE OPPOSITE DIRECTION.

Restoration Options — L4 Terminals MG Connectors
Exhibit 21



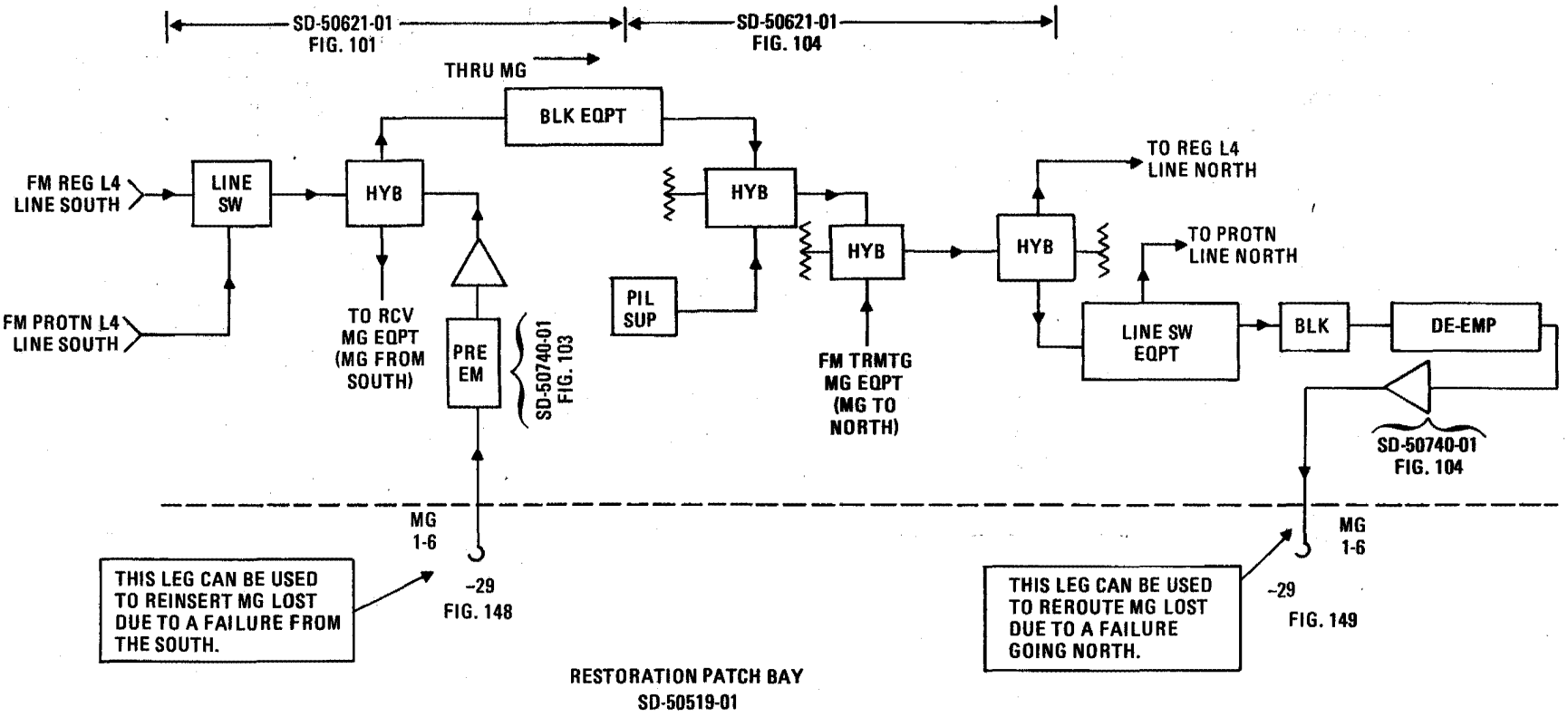
Note: THIS FIGURE SHOWS HOW ACCESS TO THE SPARE MG BANK IS GAINED. THE L-4 SYSTEM HAS AN AUTOMATIC SWITCHING SYSTEM ASSOCIATED WITH THE MG EQUIPMENT WHERE ONE SET OF SPARE MG EQUIPMENT WILL AUTOMATICALLY SWITCH TO PROTECT SEVERAL WORKING SETS. THE SPARE EQUIPMENT ALSO HAS A LOOP BACK ARRANGEMENT TO PROVIDE CONTINUITY ASSURANCE DURING IDLE PERIODS. THE PATCH BAY NEEDS CONTROLS TO DISABLE THE AUTOMATIC SWITCHING CIRCUITS AND TO KILL THE LOOP BACK FEATURE. ACCESS TO THE SPARE EQUIPMENT INPUT AND OUTPUT IS AVAILABLE AT A -29 dB LEVEL.

Restoration Options — L4 Spare MMX-2 Equipment
Exhibit 22



Notes: ALL L-4 PROTECTION LINES ARE EXTENDED TO THE PATCH BAY IN THIS MANNER. ADEQUATE CONTROLS NEED TO BE PROVIDED AT THE PATCH BAY SO THAT LINE SWITCHING CIRCUITRY CAN BE OPERATED TO "LOCK OUT" AND "ACCESS" THE PROTECTION LINES. THE DEDICATED CIRCUITRY BETWEEN THE PATCH BAY AND THE PROTECTION LINES WILL PROVIDE PRE-DISTORTED AND RE-STORER NETWORKS. L-4 LINE PILOTS ARE PROVIDED BY CIRCUITS NORMALLY A PART OF EACH PROTECTION LINE. (IT SHOULD BE NOTED HERE THAT NOTHING SHOULD BE CONNECTED TO THESE LINES EXCEPT A SIGNAL THAT HAS BEEN STACKED BY THE L-4 MMX-2 MASTER-GROUP TERMINAL EQUIPMENT.)

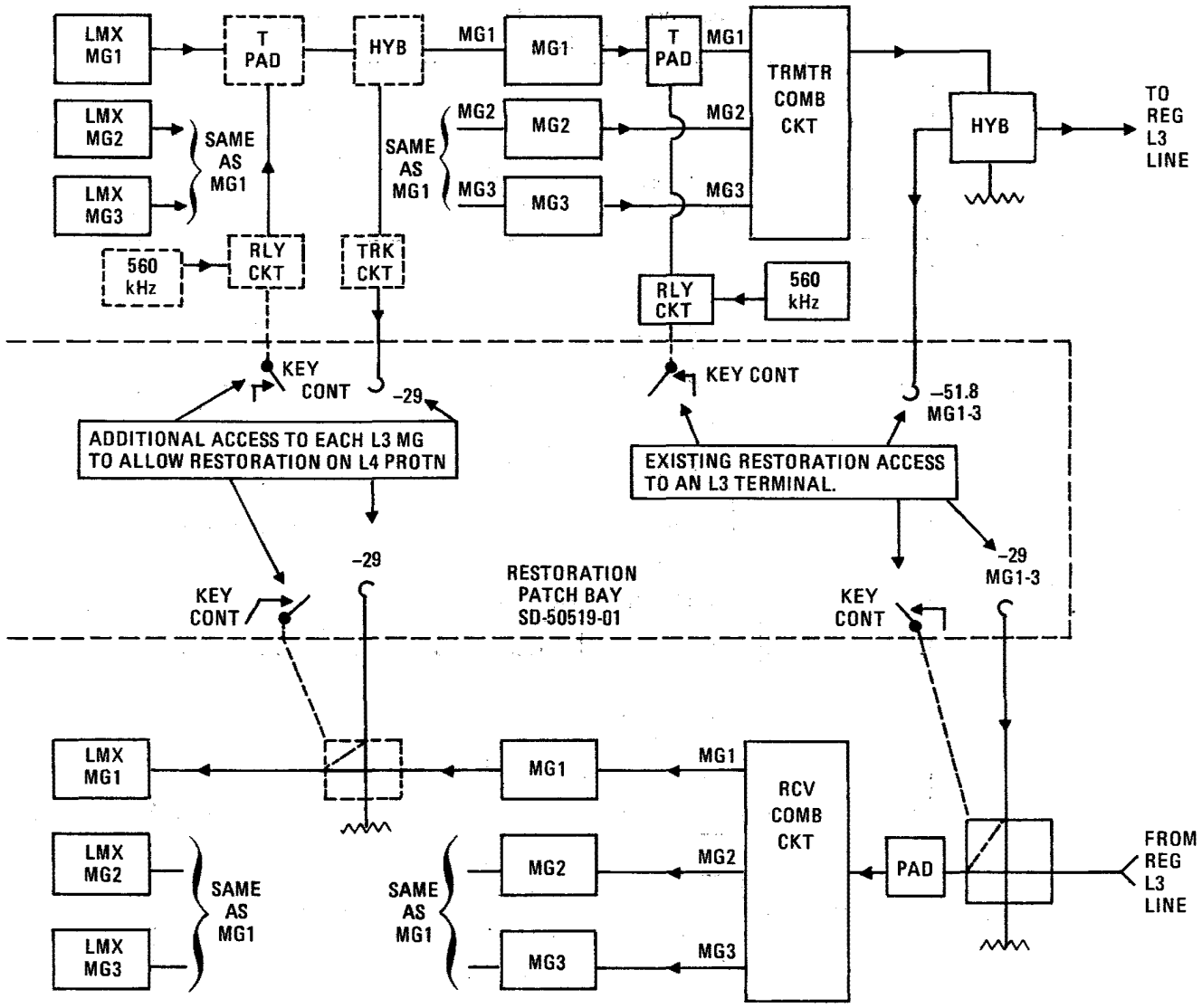
Restoration Options — L4 Protection Lines
Exhibit 23



Notes:

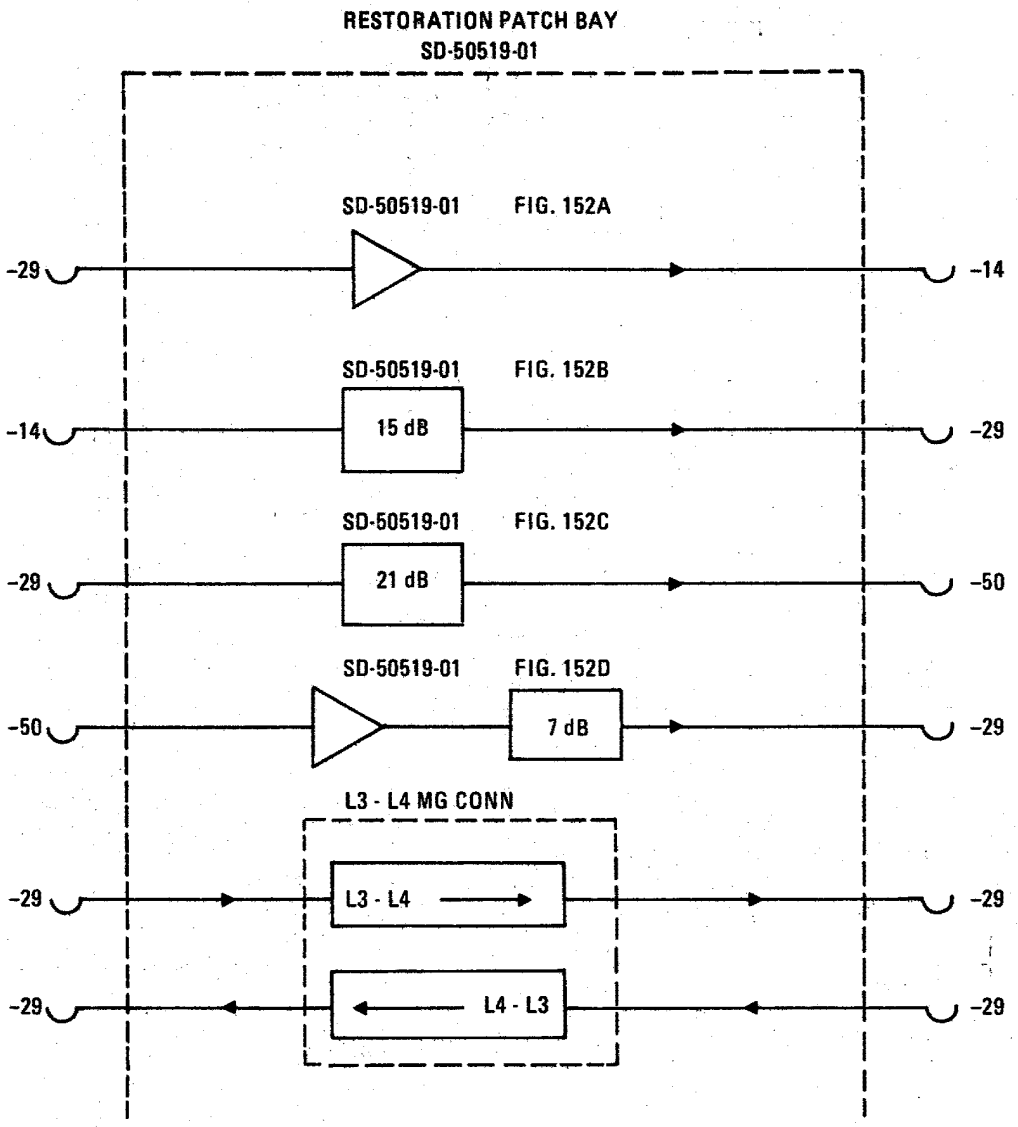
1. 560 kHz CONTINUITY TONE MUST BE APPLIED AT THE ORIGINATING ENDS OF THE MASTERGROUPS. (FIRST MMX-2 POINT.)
2. THIS FIGURE SHOWS THE OPTIONS AVAILABLE AT AN OFFICE WHERE AN L-4 LINE PASSES THROUGH BUT DROPS OR BRIDGES SOME MASTERGROUPS. RESTORATION OF SUCH A LINE AT THESE OFFICES CAN BE ACHIEVED BY CONNECTIONS AT THE POINTS SHOWN. THE SIGNAL FED INTO THE LINE WILL NEED TO BE RESTACKED, WITH MMX-2 EQUIPMENT, SOMEWHERE ALONG THE RESTORATION LAYOUT SO THAT IT WOULD EXACTLY CONFORM TO THE LINE SIGNAL AT THE POINT OF REENTRY.

Restoration Options — L4 Thru-Line Access
Exhibit 24



Note: L-3 TERMINALS PREVIOUSLY HAD ACCESS TO THE PATCH BAY AT ONLY THE LINE FREQUENCY POINT. (–51.8 dB TRANS. AND –21 dB REC.) THIS AFFORDS A WAY OF RESTORING THE L-3 ON TD-2 RADIO FACILITIES BY THE USE OF DEDICATED LINK AND FM EQUIPMENT. (THESE CONNECTIONS SHOULD REMAIN.) IF L-4 FACILITIES ARE TO BE USED TO RESTORE L-3, ACCESS TO EACH MG OF THE L-3 SYSTEM MUST BE AVAILABLE. THIS FIGURE SHOWS THE ACCESS NEEDED, AND ALL L-3 OFFICES, THAT ARE ALSO L-4 TERMINALS, SHOULD HAVE L-3 ACCESS PROVIDED IN THIS MANNER.

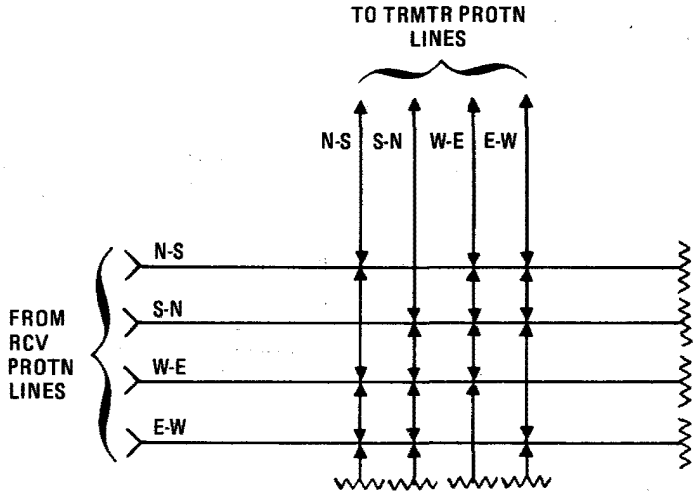
Restoration Options — Modify L3 Terminals to be Restorable on L4 Protection
Exhibit 25

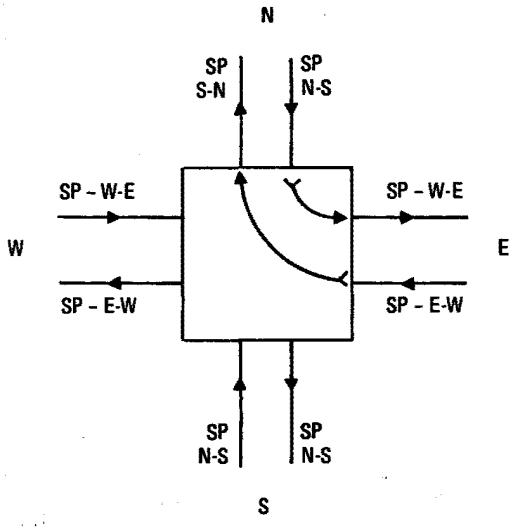


Notes:

1. SIX EACH OF THESE OPTIONS SHOULD BE FURNISHED.
2. VARIOUS ITEMS OF INTERCONNECT CIRCUITRY ARE NEEDED AT A PATCH BAY TO AFFORD THE REQUIRED LEVEL COMPATIBILITY BETWEEN PATCHING POINTS. SPARE MG CONNECTORS ALSO ARE NEEDED TO MAKE CERTAIN CONNECTIONS. THIS FIGURE SHOWS SOME OF THE OPTIONS AVAILABLE. A COMBINATION TD-2, L-3, AND L-4 TERMINAL SHOULD HAVE SIX (6) EACH OF THE OPTIONS SHOWN HERE.

Restoration Options — Miscellaneous Interconnecting Equipment
Exhibit 26

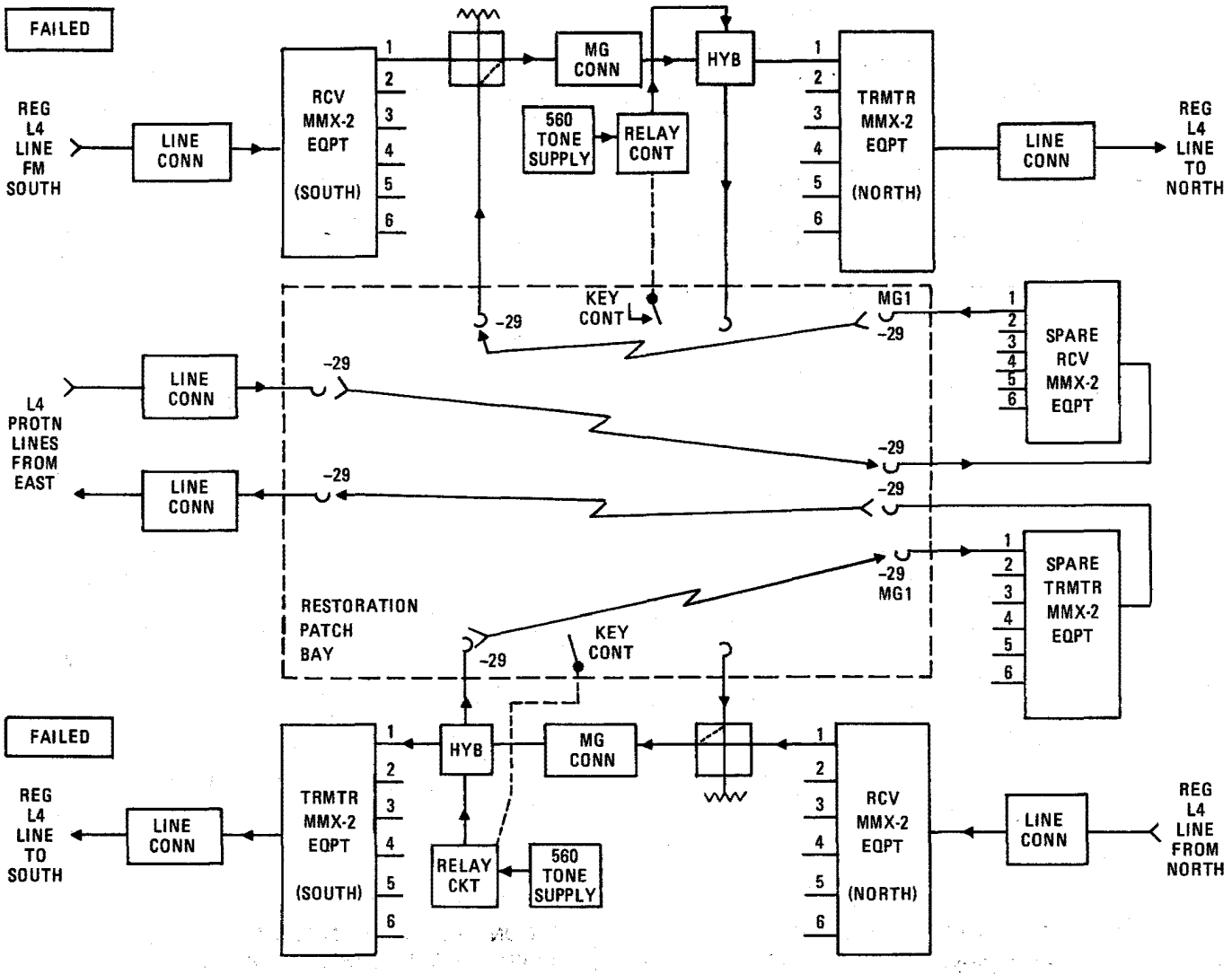




Notes:

1. PROVIDE FOR FULL INTERCONNECT FLEXIBILITY OF L-4 PROTECTION LINES AT ALL MULTI-POINT STATIONS.
2. MATRIX SWITCHES SHOULD BE WIRED FOR LOCAL CONTROL AND VIA REMOTE ALARM FAX WHERE FULL OFFICE COVERAGE IS NOT AVAILABLE.
3. A STATION CONTAINING ONLY TWO (2) DIRECTIONS OF L-4 CAN BE PROVIDED WITH PERMANENT CABLING TO CONNECT THE PROTECTION LINES THRU FOR RESTORATION PURPOSES. IF MORE THAN TWO (2) DIRECTIONS ARE INSTALLED, SOME TYPE OF PROTECTION LINE INTERCONNECT CIRCUITRY IS NEEDED.

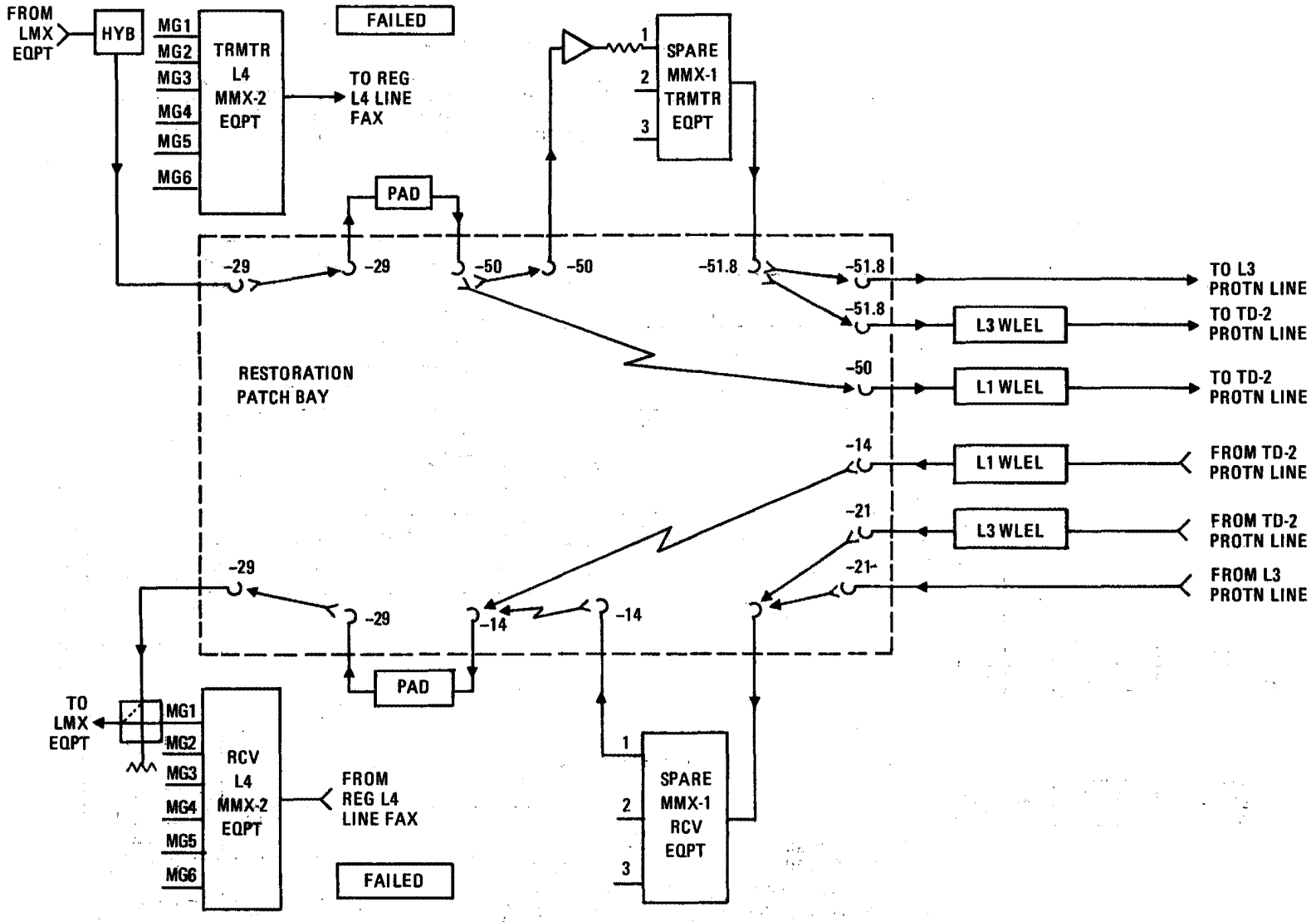
Restoration Options — Interconnection of L4 Protection Lines at Multidirectional Points
Exhibit 27



Notes:

1. APPLY 560 kHz CONTINUITY TONE TO EACH MG BEING RESTORED.
2. RE-ENTRY AT A MG CONNECTOR POINT IS SHOWN IN THIS FIGURE. THE RESTORATION LAYOUT USED HERE HAPPENS TO BE AN L-4 PROTECTION LINE IN ANOTHER DIRECTION, BUT ANY OTHER TYPE OF FACILITY WOULD BE SATISFACTORY PROVIDED IT WAS PROPERLY CONVERTED DOWN TO THE MG FREQUENCY SPECTRUM. (NOTE THAT THE 560 kHz CONTINUITY TONE CAN BE APPLIED AT THIS POINT. THIS TONE IS APPLICABLE AT THE ORIGINATING END OF A MASTERGROUP OR AT EACH MG CONNECTOR POINT.)

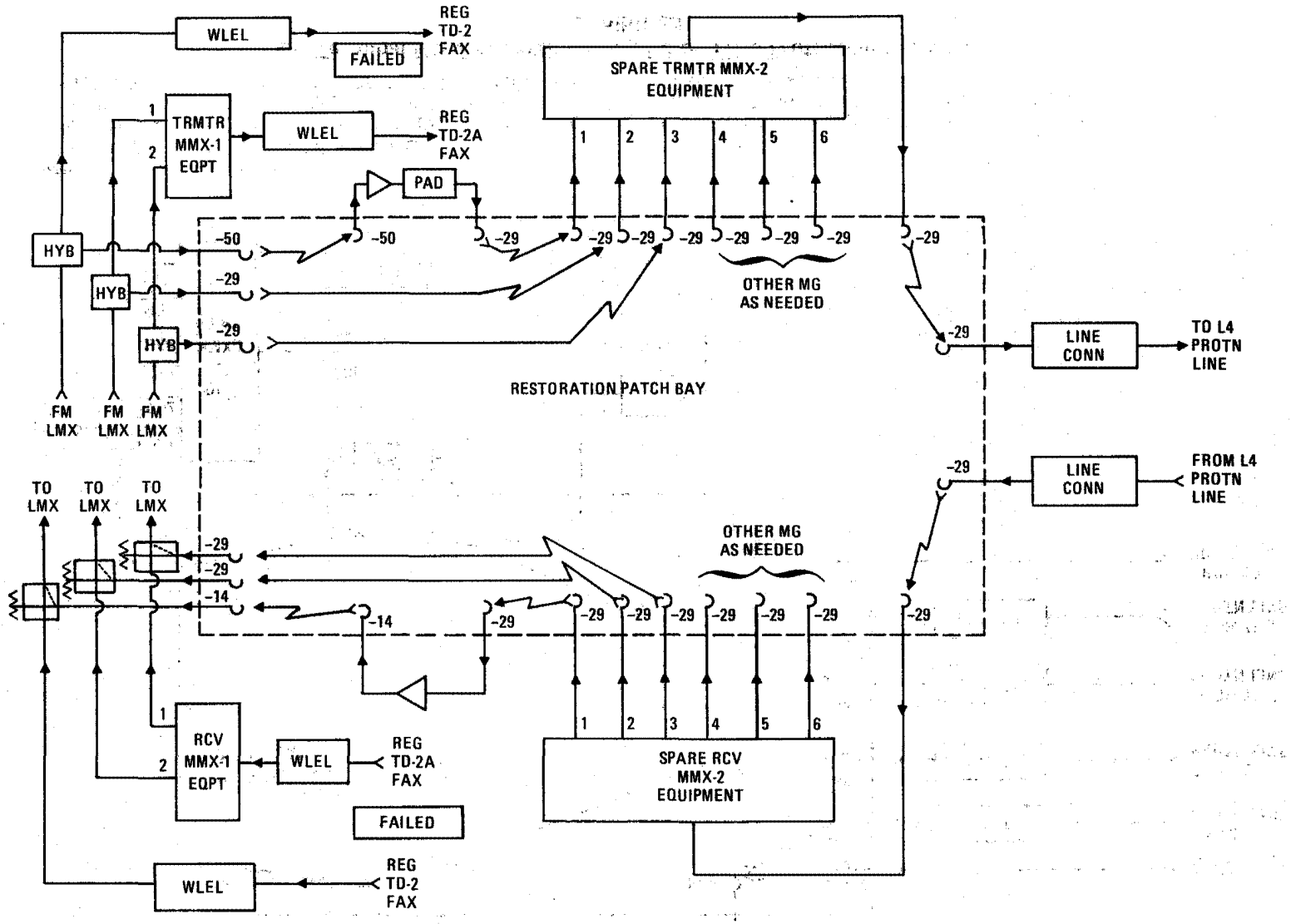
L4 Restoration using Reentry at an MG Connector Point
Exhibit 28



Notes:

1. 560 kHz TO BE APPLIED TO EACH L-4 MG.
2. THIS FIGURE SHOWS HOW THE L-4 SYSTEM CAN BE RESTORED ON RADIO OR L-3 FACILITIES. THE SIX (6) MG OF THE L-4 SYSTEM ARE PICKED UP INDIVIDUALLY, 560 kHz TONE APPLIED, AND THEN STACKED AS REQUIRED TO FIT THE RESTORATION FACILITY BEING USED. (NOTE, THE USE OF SOME OF THE MISCELLANEOUS LEVEL ADJUSTING FEATURES.)

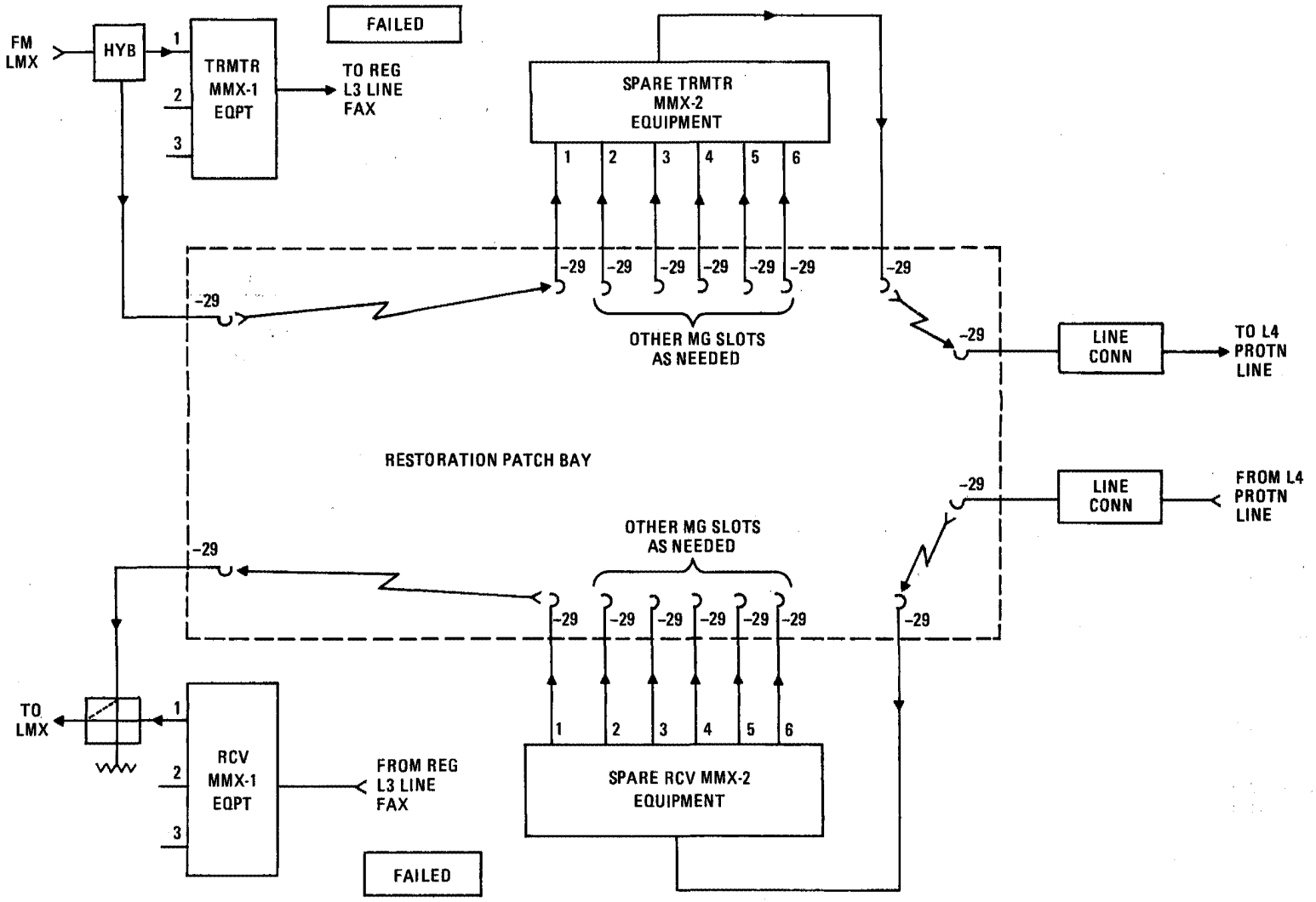
L4 Terminal MG Restoration using L3 or TD-2 Protection Facilities
Exhibit 29



Notes:

1. 560 kHz TO BE APPLIED TO EACH TD-2 OR TD-2A MASTER GROUP.
2. HERE THE L-4 PROTECTION LINE IS CONNECTED TO ITS SPARE MMX-2 EQUIPMENT TO CREATE SIX (6) MG RESTORATION SLOTS. THESE SIX (6) SLOTS ARE THEN FILLED BY INSERTING VARIOUS FAILED RADIO SYSTEMS MASTERGROUPS. (NOTE THAT ALL RADIO SYSTEMS MUST BE PICKED UP ON AN INDIVIDUAL MG BASIS AND 560 kHz CONTINUITY TONE APPLIED TO EACH.)

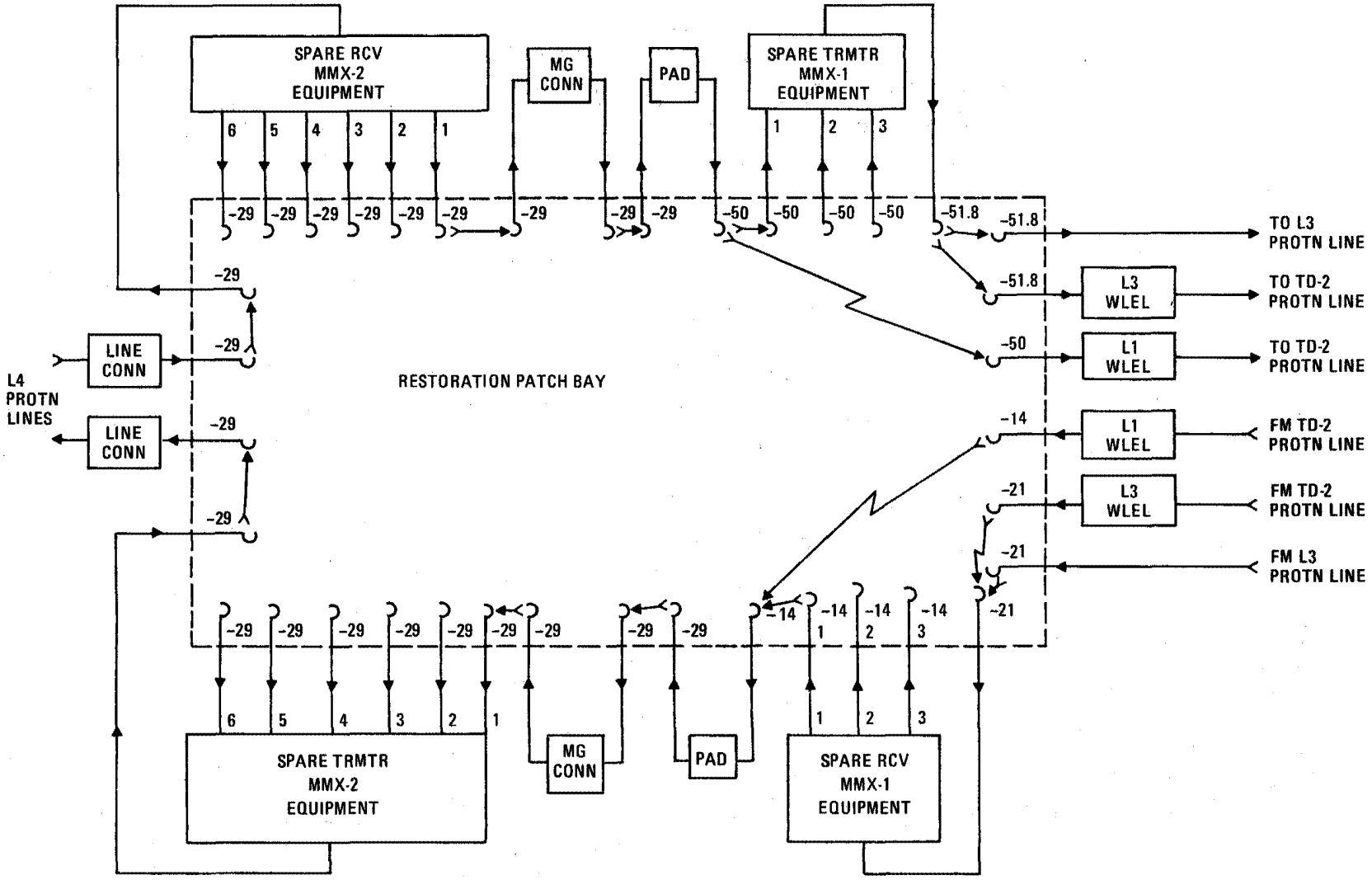
TD-2 Radio Restoration using L4 Protection Line
Exhibit 30



Notes:

1. 560 kHz TO BE APPLIED TO EACH L-3 MG.
2. L-3 TERMINALS MUST BE MODIFIED SO EACH MG WILL HAVE ACCESS AT THE RESTORATION PATCH BAY.
3. THE L-3 TERMINAL IS PICKED UP ON AN INDIVIDUAL MG BASIS, 560 kHz TONE APPLIED TO EACH MG, AND SIX (6) MG ARE RESTACKED BY MMX-2 EQUIPMENT AND APPLIED TO THE L-4 PROTECTION LINE. (DO NOT TRY TO PICK THE L-3 TERMINAL UP AT THE LINE FREQUENCY SPECTRUM AND PATCH INTO THE L-4 LINE. THIS WILL MOST PROBABLY KILL THE L-4 PROTECTION LINE.)

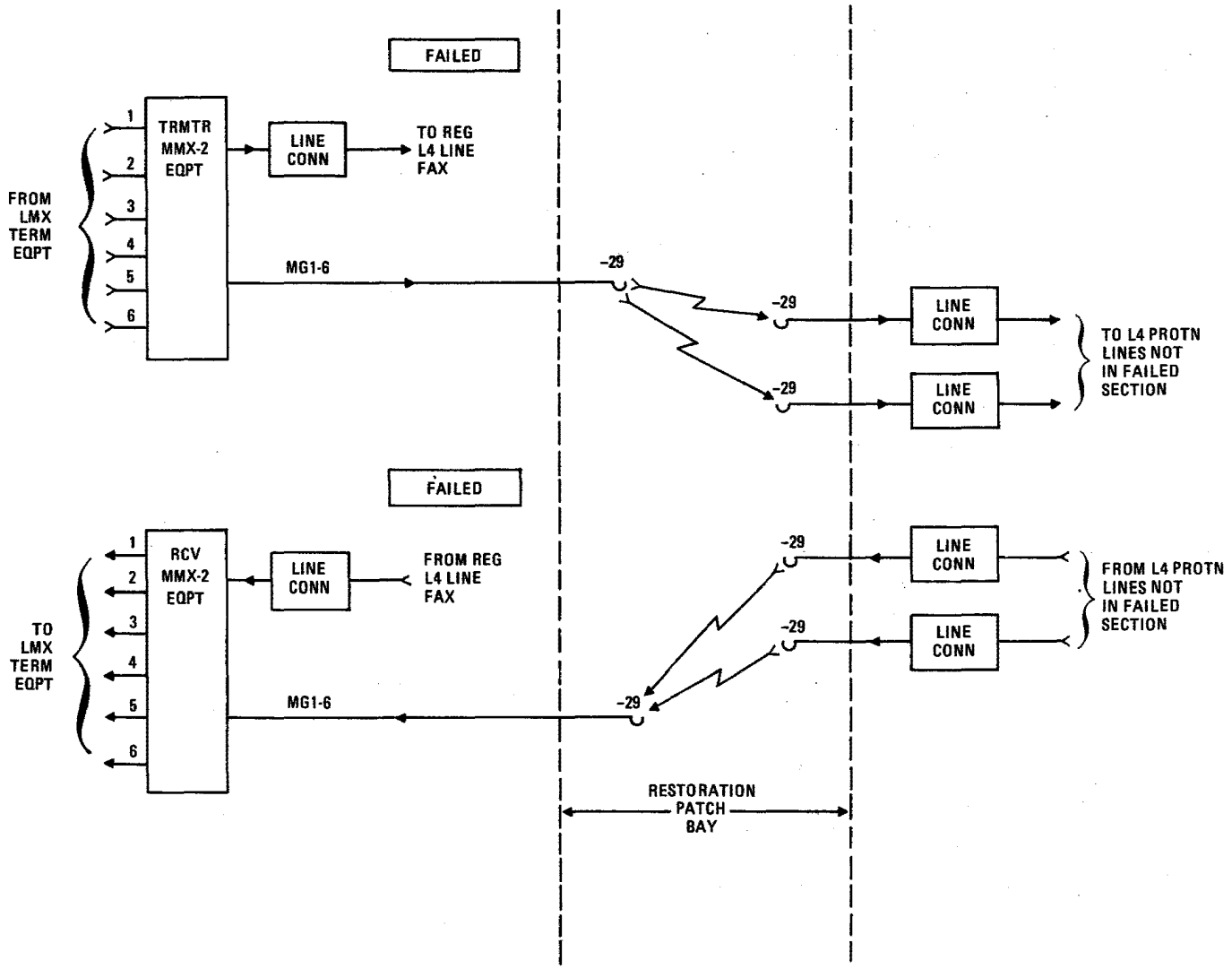
L3 Restoration using L4 Protection Line
Exhibit 31



Notes:

1. MASTER GROUPS INTERCONNECTED AS REQUIRED USING PATCHES AS SHOWN FOR MG-1.
2. L-4 PROTECTION LINES CANNOT BE INTERCONNECTED TO OTHER TYPES OF PROTECTION LINES EXCEPT BY COMING DOWN TO MASTERGROUPS WITH EACH FACILITY AND USING MG CONNECTORS TO MAKE THE UNION. THIS FIGURE SHOWS THE PATCHES NECESSARY FOR ONE MASTER-GROUP. FIVE OTHER SIMILAR PATCHES WOULD BE NEEDED TO COMPLETELY LOAD THE L-4 LINE.

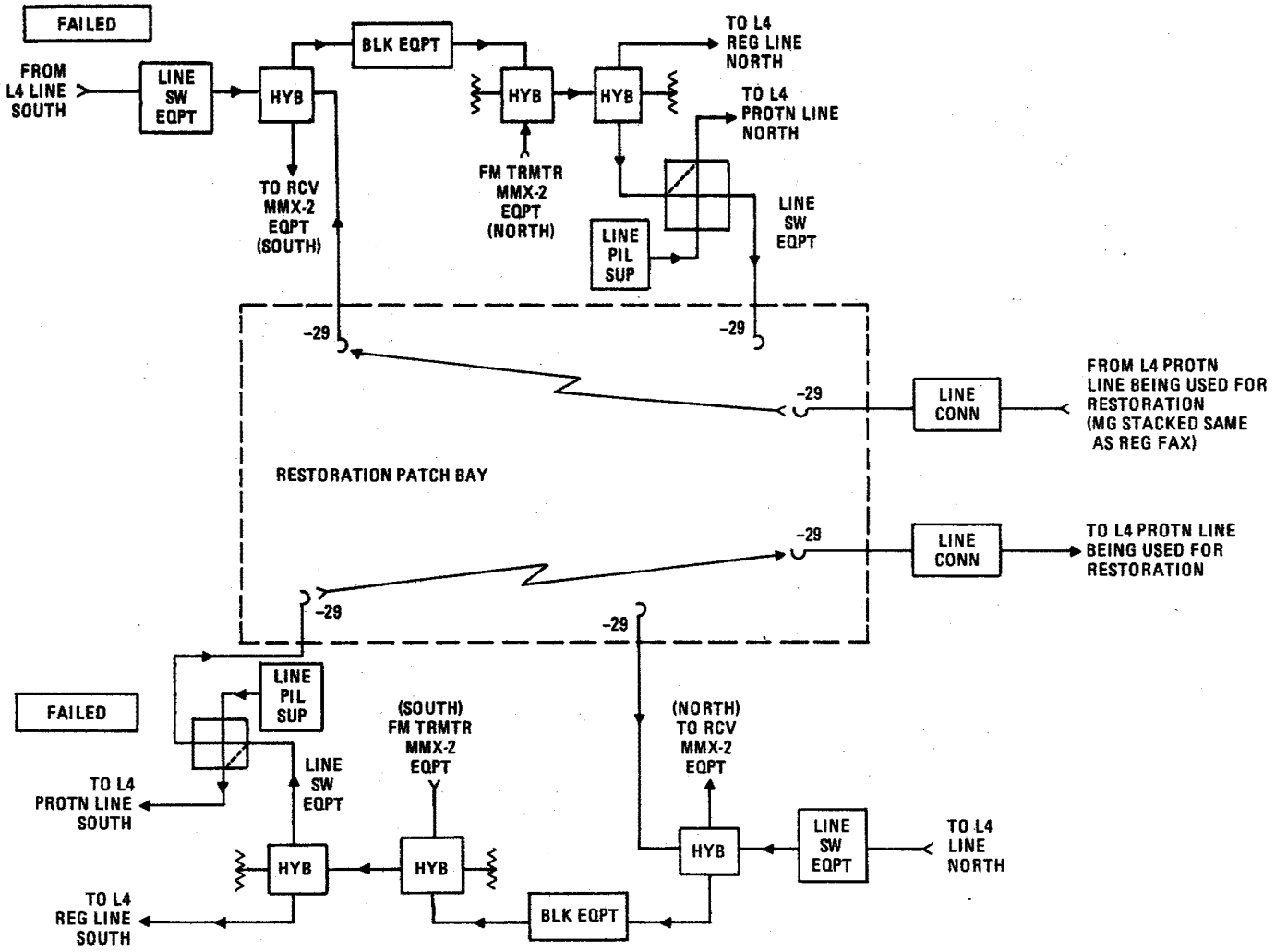
Interconnection of L4 Protection Line to TD-2, L3, or L1 Protection Line
Exhibit 32



Notes:

1. 560 kHz TO BE APPLIED TO EACH L-4 MASTER GROUP.
2. A COMPLETE SIX (6) MG L-4 TERMINAL CAN BE CONNECTED TO UNRELATED L-4 PROTECTION LINES LEAVING AN OFFICE BY THE METHOD SHOWN IN THIS FIGURE. 560 kHz SHOULD BE APPLIED TO EACH OF THE SIX (6) TRANSMITTING MASTERGROUPS SINCE THE RESTORATION LAYOUT WILL PROBABLY HAVE TO BE BROKEN DOWN AT SOME INTERMEDIATE POINT AND CONNECTED TO OTHER TYPE FACILITIES AS SHOWN IN FIGURE 13. ALSO, THE SIX (6) MG PROBABLY WILL NOT ALWAYS SHARE A COMMON DISTANT TERMINAL, NECESSITATING AN INDIVIDUAL CONTINUITY TONE ON EACH.

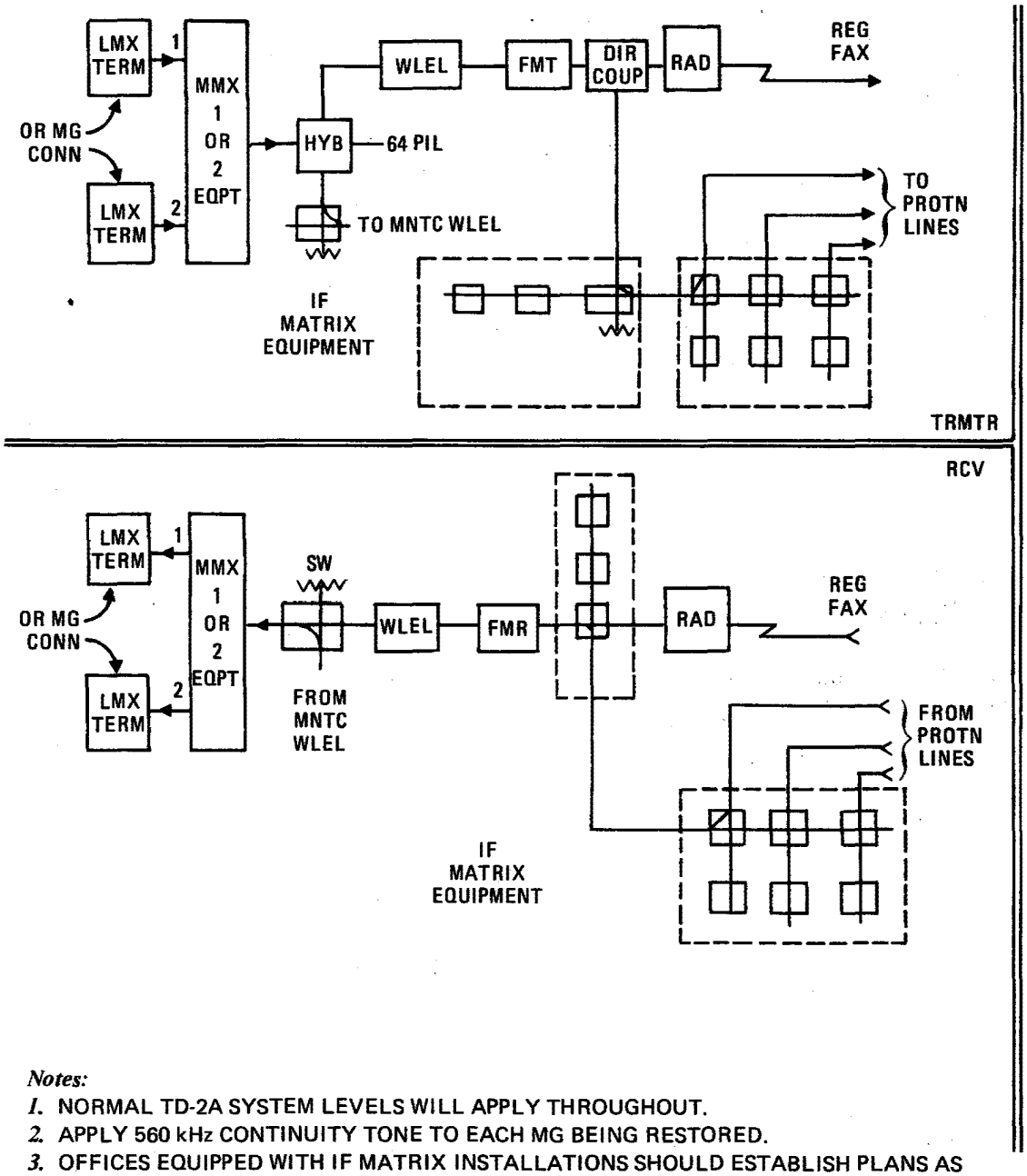
L4 Protection using L4 Protection Lines in Other Switching Sections
Exhibit 33



Notes:

1. THE SPARE MMX-2 EQUIPMENT AND MG CONNECTORS COULD BE USED TO CONNECT TO ANY OTHER TYPE OF RESTORATION FACILITY. (PATCHES SHOWN IN FIG. 13.)
2. BLOCKING OR BRIDGING POINTS ON AN L-4 LINE CAN BE RESTORED USING THE METHODS SHOWN HERE. SUCH A CONNECTION WILL AUTOMATICALLY TAKE CARE OF ANY MG THAT IS DROPPED AS WELL AS THOSE PASSING THROUGH. SUCH PROCEDURES THOUGH, WILL REQUIRE SPECIAL EFFORTS TO SEE THAT ALL MG ARE PROPERLY RESTACKED BEFORE LINE CONNECTIONS ARE MADE.

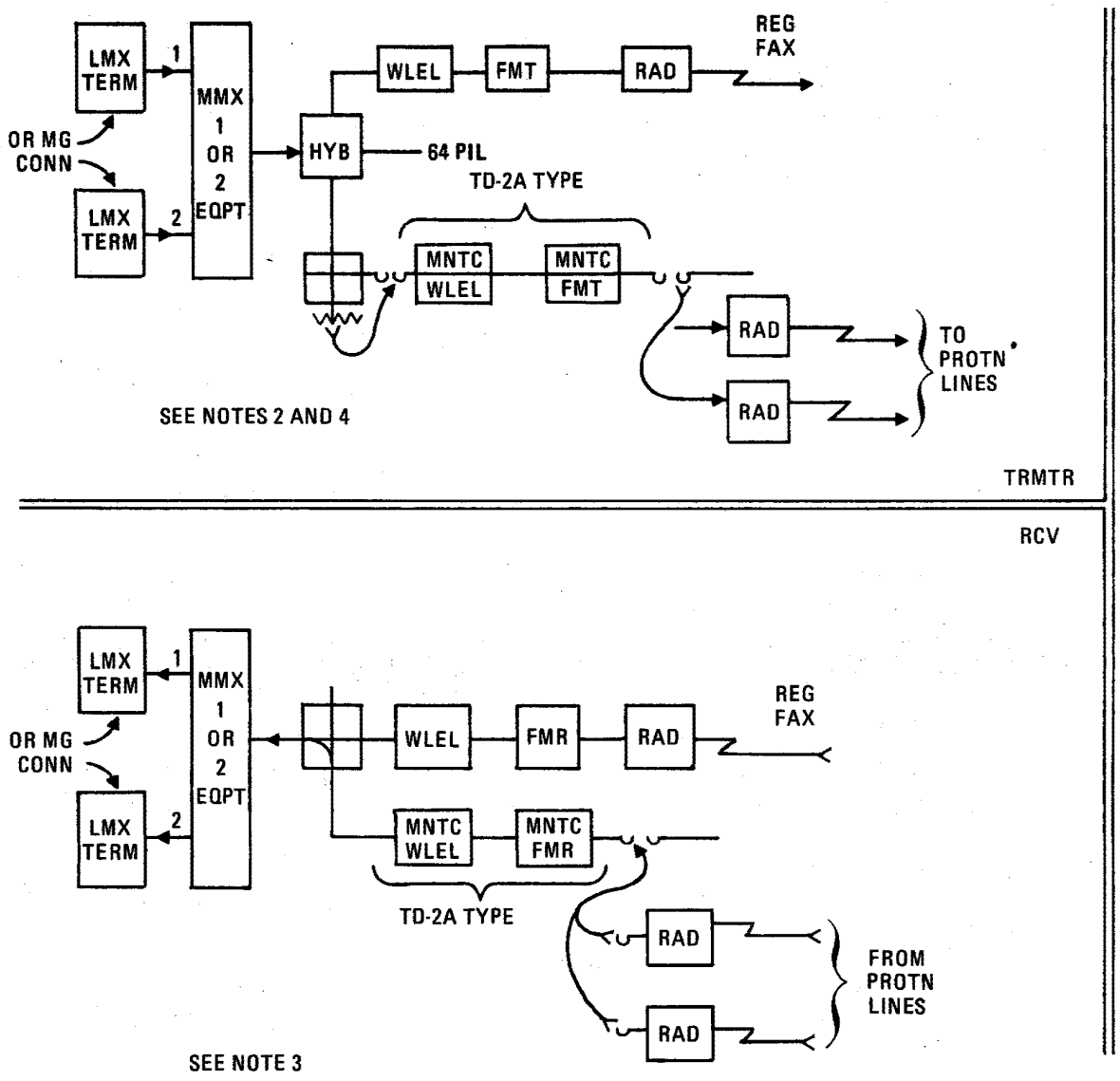
L4 Restoration using Reentry at a Thru and Dropping Point
Exhibit 34



Notes:

1. NORMAL TD-2A SYSTEM LEVELS WILL APPLY THROUGHOUT.
2. APPLY 560 kHz CONTINUITY TONE TO EACH MG BEING RESTORED.
3. OFFICES EQUIPPED WITH IF MATRIX INSTALLATIONS SHOULD ESTABLISH PLANS AS SHOWN IN THIS EXHIBIT. 560 kHz CONTINUITY TONE SHOULD BE APPLIED TO BOTH MASTERGROUPS IN THE FIRST STEPS OF ESTABLISHING THE PLAN AND REMOVED IN THE LAST STEPS OF INACTIVATING. NORMAL 560 kHz CONTINUITY CHECKING EQUIPMENT PROVIDED WITH THE MATRIX SHOULD BE USED IN CHECKING CONTINUITY.

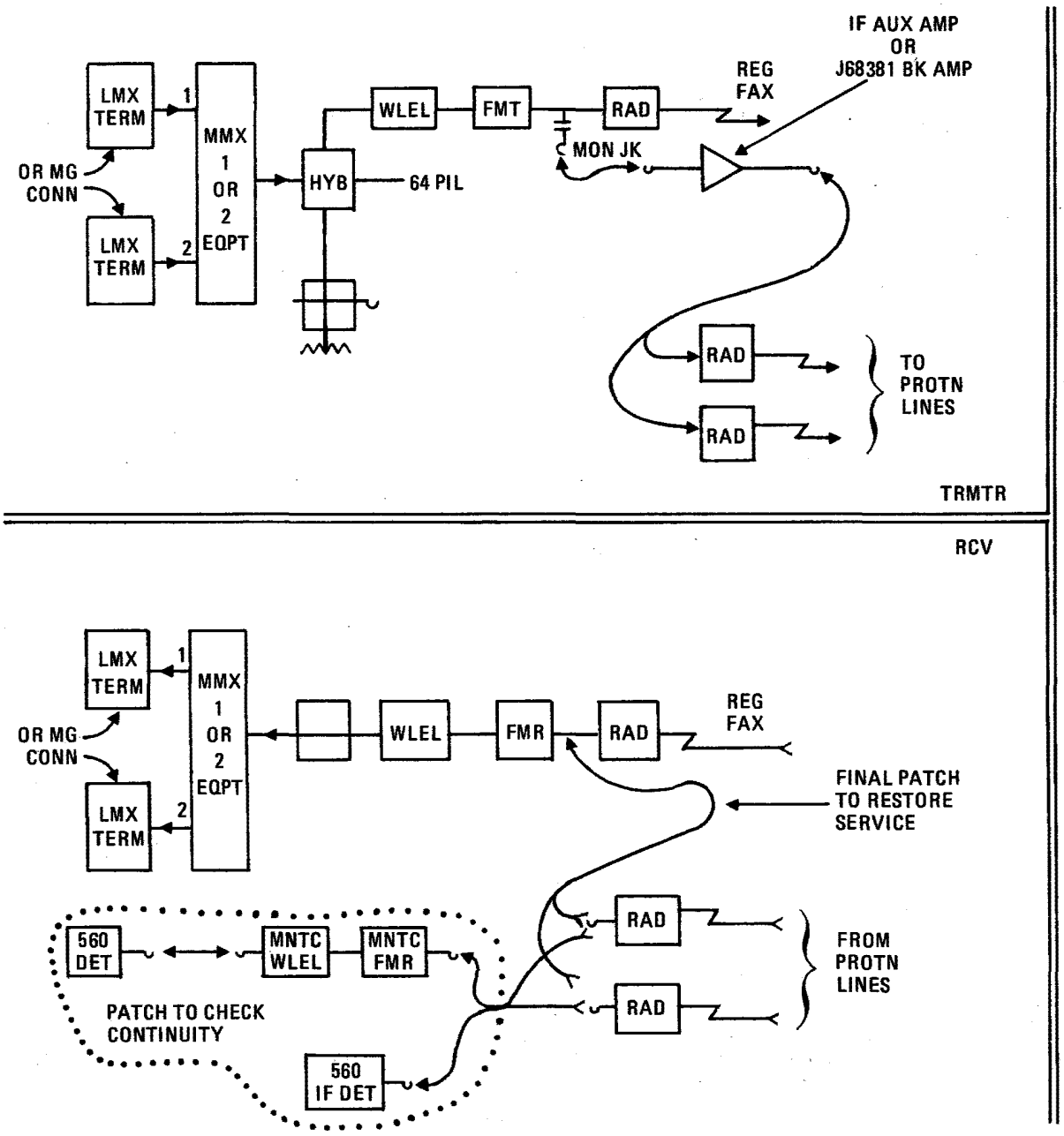
TD-2A Restoration using Radio Protection Facilities
(Matrix Switching Office)
Exhibit 35



Notes:

1. NORMAL TD-2A SYSTEM LEVELS WILL APPLY THROUGHOUT.
2. WHERE MAINTENANCE LINK HAS SWITCHABLE PREEMPHASIS, SET UP PLAN BY FIRST SWITCHING SERVICE TO THE MAINTENANCE LINK. PATCH "MAKE GOOD" LAYOUT TO THE REGULAR LINK AND SWITCH BACK REGULAR.
3. WHERE MAINTENANCE LINK HAS SWITCHABLE DEEMPHASIS, SET UP PLAN BY FIRST SWITCHING SERVICE TO THE MAINTENANCE LINK. PATCH "MAKE GOOD" LAYOUT TO THE REGULAR LINK AND SWITCH BACK REGULAR.
4. APPLY 560 kHz CONTINUITY TONE TO EACH MG BEING RESTORED.
5. IF NO SPECIAL RESTORATION EQUIPMENT (MATRIX, PATCH BAY, ETC) IS AVAILABLE IN AN OFFICE, PLANS CAN BE ESTABLISHED BY THIS FIGURE. THE NORMAL "MAINTENANCE SPARE" LINKS AND FM EQUIPMENT SHOULD BE UTILIZED. 560 kHz CONTINUITY TONE SHOULD BE APPLIED TO BOTH TRANSMITTING MASTERGROUPS. CONTINUITY SHOULD BE VERIFIED ON THE OUTPUT OF THE RECEIVING LINK BY USE OF A 560 kHz DETECTOR CIRCUIT APPEARING IN THE TD-L BAY LOCATION.

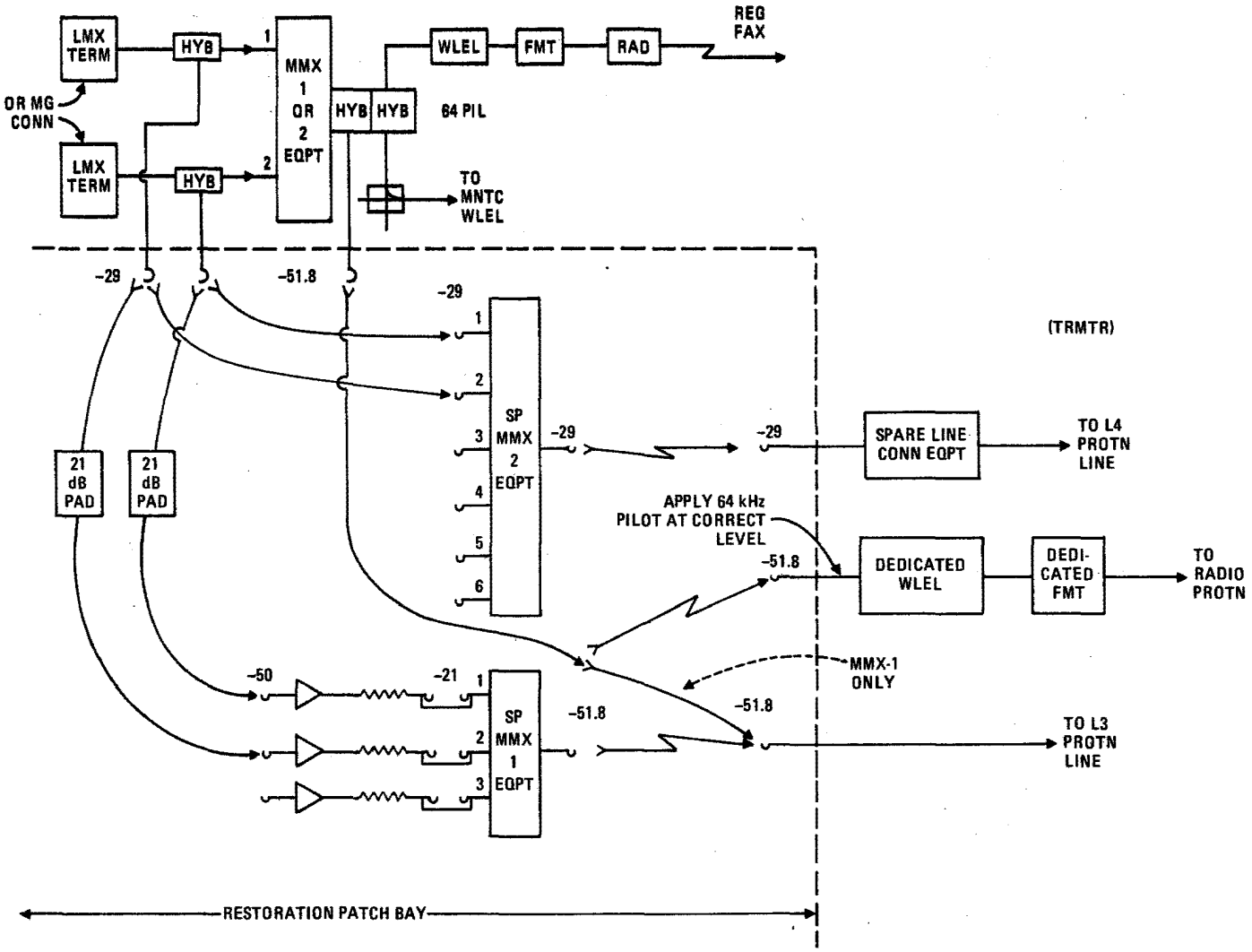
TD-2A Restoration using Radio Protection Facilities
(Nonmatrix Office)
(Using Maintenance Links)
Exhibit 36



Notes:

1. NORMAL TD-2A SYSTEM LEVELS WILL APPLY THROUGHOUT.
2. APPLY 560 kHz CONTINUITY TONE TO EACH MG BEING RESTORED.
3. IF NO SPECIAL RESTORATION EQUIPMENT (MATRIX, PATCH BAY, ETC) IS AVAILABLE IN AN OFFICE, PLANS CAN BE ESTABLISHED BY THIS FIGURE. THIS METHOD ALLOWS ALL WORK TO BE DONE BY IF PATCHES AT THE "PROGRAM PATCH BAY" AND "FM PATCH BAY" 560 kHz CONTINUITY TONE SHOULD BE APPLIED TO BOTH TRANSMITTING MASTERGROUPS AND MEASURED RECEIVING AS SHOWN IN EXHIBIT 1.

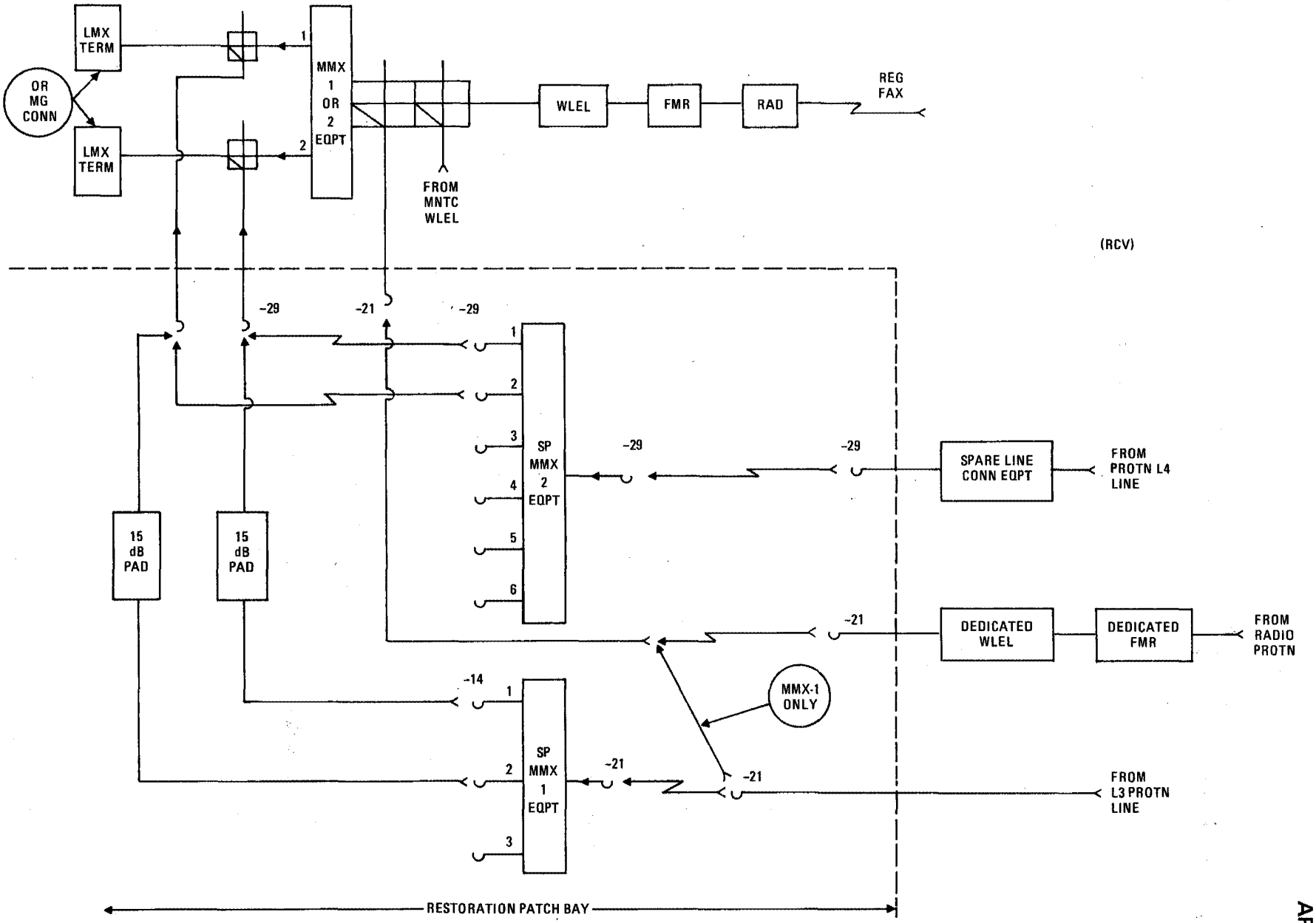
TD-2A Restoration using Radio Protection Facilities
(Nonmatrix Office)
(No Maintenance Links Available)
Exhibit 37



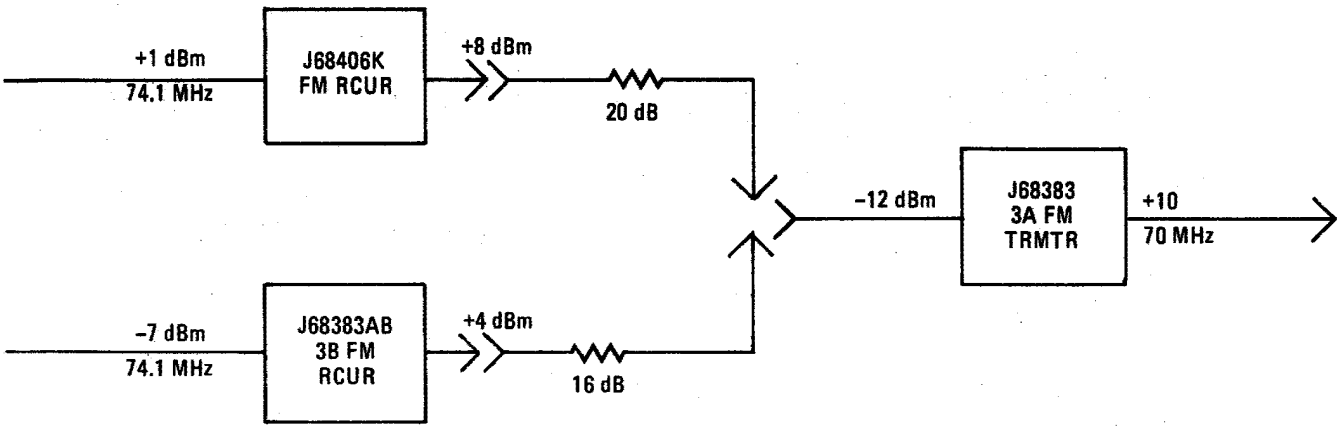
Notes:

1. APPLY 560 kHz CONTINUITY TONE TO EACH MG BEING RESTORED.
2. OFFICES EQUIPPED WITH A RESTORATION PATCH BAY SHOULD HAVE THE EXPANDED RADIO SYSTEMS EXTENDED TO THE RPB AS SHOWN IN THESE FIGURES. THE OFFICE PROCEDURES FOR RESTORING A FAILED SYSTEM BY USE OF THE RPB ARE ALSO INDICATED IN THE FIGURES. APPLY 560 kHz CONTINUITY TONE TO BOTH MASTERGROUPS OF THE FAILED SYSTEM. PATCH BAY OFFICES SHOULD HAVE DEDICATED FM EQUIPMENT AND WIRE LINE ENTRANCE LINKS WITH CHANGEABLE GAINS AND EMPHASIS NETWORKS TO DO THE VARIOUS TYPES OF RESTORATION JOBS.

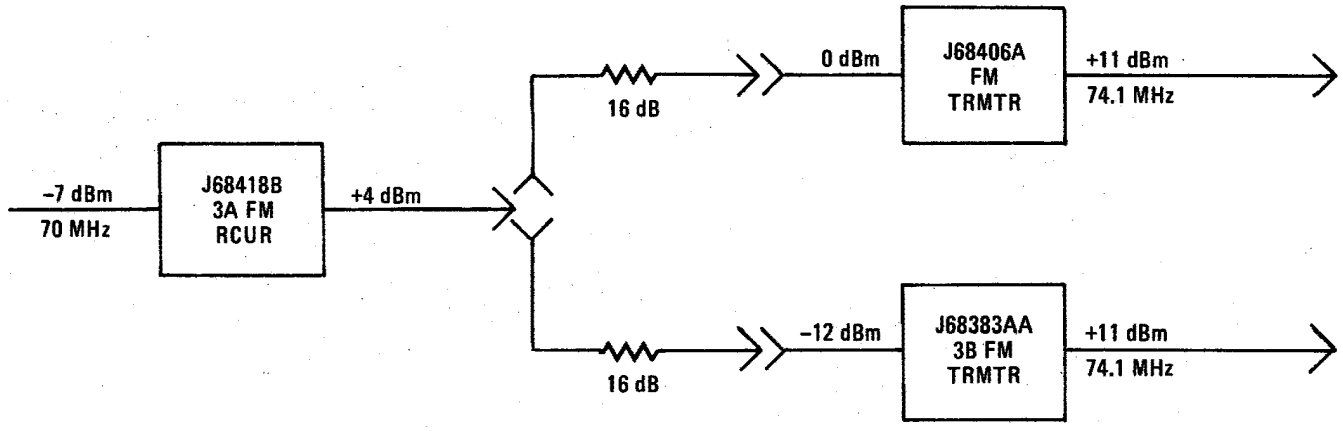
TD-2A Restoration Facilities
(Patch Bay Office)
using COAX Protection or Radio Protection
Exhibit 38



TD-2A Restoration using COAX Protection Facilities
(Patch Bay Office)
using COAX Protection or Radio Protection
Exhibit 39

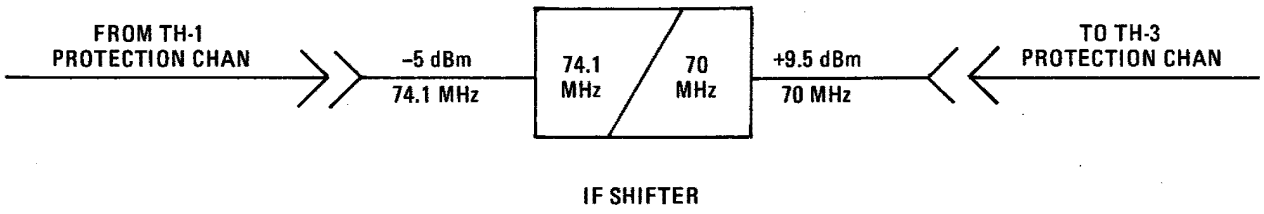


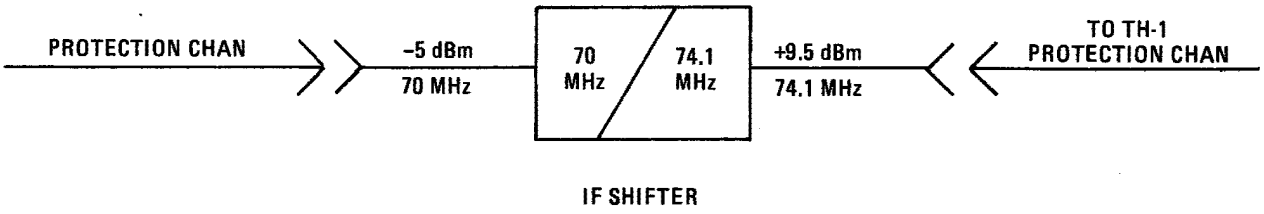
METHOD OF CONNECTING
TH-1 TO TH-3



METHOD OF CONNECTING
TH-3 TO TH-1

Typical Sketches for Interconnecting TH-1 and TH-3 Facilities
Exhibit 40





Typical Sketches for Method of Interconnecting TH-1 and TH-3 Facilities Using IF Shifters
Exhibit 41